Inquiry on Federal Water Policy
Research Paper # 8

BOUNDARY WATER RELATIONS AND GREAT LAKES ISSUES

by

David G. LeMarquand

March 1985
Ottawa

THE INQUIRY ON FEDERAL WATER POLICY

The Inquiry on Federal Water Policy was appointed by the federal Minister of the Environment in January of 1984 under the authority of the Canada Water Act. The members were Peter H. Pearse, chairman; Françoise Bertrand, member; and James W. MacLaren, member. The Inquiry was required by its terms of reference to review matters of water policy and management within federal jurisdiction and to make recommendations.

This document is one of a series of research papers commissioned by the Inquiry to advance its investigation. The views and conclusions expressed in the research papers are those of the authors. Copies of research papers and information on the series may be obtained by writing to the Enquiry Centre, Environment Canada, Ottawa, Ontario K1A 0H3.

Frank Quinn
Director of Research

ABSTRACT

The paper examines some of the main features of Canada-United States boundary water relations and some current Great Lakes problems. The intent is to provide a perspective on the problems and opportunities for responding to boundary water problems and for managing satisfactorily boundary water resources.

The Boundary Waters Treaty of 1909 provides some basic principles that guide relations with regard to water use along the boundary. It also establishes the International Joint Commission. The principles and the commission have proven invaluable in establishing the principle of equality in the use of boundary resources and in joint problem solving approaches. In practice, the equality principle works well in the conduct of IJC activities and for issues where there is a reciprocal interest between Canada and the United States to reach agreement. However, in the resolution of some of the most important boundary issues, for example wide-spread Great Lakes water quality problems or acid rain, the United States sees little advantage to negotiating agreements with Canada ahead of domestic resolution of the issues. In other issues, such as unequal consumption of boundary waters, the United States tends to interpret the equality principle differently from Canada and dismiss Canadian objections to loss of water without compensation. The relative insensitivity of American political processes to the effects of American activities on Canada means a poor response in the United States to Canadian governments initiatives for many of these important issues. When the United States does seek accommodation for issues like water quality it tends to demand of Canada similar commitments to solving the problem as it requires of American interests. The stress on equitable commitment is at odds with Canadian concerns for equality and equal sharing of boundary resources.

While the scope for Canadian initiatives in many issues dealing with the Great Lakes is limited there are a number measures that can be undertaken to ensure better reception of Canadian views in Washington. These include: strengthening of the IJC, thinking innovatively to define issues in a manner that creates a reciprocal interest in achieving bilateral agreement, encouraging transnational approaches to boundary issues, greater political commitment of national leaders to pursue environmental and boundary water objectives, integrated federal-provincial responses to boundary water problems, and increasing and expanding the research and scientific capabilities of the federal government agencies involved in boundary water issues.

Résumé

Ce rapport étudie quelques-unes des caractéristiques principales des relations Canada-États-Unis sur les eaux frontalières et quelques-uns des problèmes actuels des Grands Lacs. Le but de ce rapport est de donner une idée des problèmes rencontrés dans les eaux frontalières et d'identifier des éléments de solution à ces problèmes et des éléments de gestion plus satisfaisants.

Le Traité des eaux limitrophes de 1909 fournit quelques principes de base qui guident les relations quant à l'utilisation de l'eau le long de la frontière. Ce Traité donne aussi naissance à la Commission Mixte Internationale. Les principes énnoncés dans le Traité et la Commission se sont avérés inestimables quant à l'établissement du principe d'égalité dans l'utilisation des resources frontalières et en permettant un approche conjointe de résolution des problèmes. En pratique, le principe d'égalité est efficace quant à la conduite des activités de la CMI et pour les questions pour lesquelles il y a un intérêt réciproque de la part du Canada et des États-Unis afin d'en venir à une entente. Cependant, pour la résolution de certains des plus importants problèmes frontaliers, par exemple, la pollution à grande échelle de l'eau des Grands Lacs ou les pluies acides, les États-Unis ont peu d'avantage de négocier des ententes avec le Canada avant la résolution de ces problèmes dans leur propre pays.

Pour d'autres questions, tel la consommation inégale d'eau à la frontière, les États-Unis ont tendance à interpréter le principe d'égalité différemment du Canada et rejettent les objections canadiennes au sujet de ces pertes d'eau non compensées. L'insensibilité relative du processus politique américain face aux effets produits sur le Canada par leurs activités entraîne une réponse mitigée de la part des États-Unis face aux initiatives du gouvernement canadien à propos de plusieurs de ces importantes questions. Quand les États-Unis demandent des accommodements sur certaines questions, telle la qualité des eaux, ils ont tendance à demander des engagements similaires à ceux requis auprès des intérêts américains pour la résolution de ces problèmes. La pression pour obtenir des engagements équitables est opposée au souci canadien face à l'égalité et au partage à parts égales des resources frontalières.

Bien que l'étendue des initiatives canadiennes pouvant être prises face aux Grands Lacs est limitée, il y a un certain nombre de mesures qui peuvent être entreprises afin d'assurer une meilleure réception du point de vue canadien à Washington. Celles-ci comprennent: 1) un renforcement du rôle de la CMI; 2) une manière de penser plus innovative afin de définir les problèmes de manières a créer un intérêt réciproque à parvenir à une entente; 3) l'encouragement d'approches transnationales des problèmes frontaliers; 4) un plus grand engagement politique de la part des leaders nationaux à se plier aux objectifs environnementaux et des eaux frontalières; 5) une réponse fédérale-provinciale unifiée face aux problèmes frontaliers et; 6) une expansion de la capacité scientifique et de recherche des agences gouvernementales fédérales impliqueés dans les questions relatives aux eaux frontalières.

TABLE OF CONTENTS

PART 1. CANADA-UNITED STATES BOUNDARY WATERS 1

1.1. CANADIAN-AMERICAN TRANSBOUNDARY WATER RELATIONS 3

Boundary Issues 3
United States Dominance 6
Management Philosophies 9
Federalism 12

1.2 THE BOUNDARY WATERS TREATY 14

The Boundary Waters Treaty of 1909 16
The Boundary Waters Treaty in Practice 21

1.3 THE INTERNATIONAL JOINT COMMISSION 24

The Work of the IJC 26
Boundary Waters Treaty, the IJC, and Reform 29

PART 2. GREAT LAKES ISSUES 34

2.1 GREAT LAKES FLOWS AND LEVELS ISSUES 37

DIVERSIONS 37
Long Lac-Ogoki Diversions 39
Chicago Diversion 40
Potential Diversions 41
Water Export by Tanker 44
CONSUMPTIVE USES 47
CLIMATIC CHANGE 49
LAKE ERIE 50
NIAGARA RIVER POWER 51
ST MARYS RIVER 55
WINTER NAVIGATION 56

2.2 GREAT LAKES WATER QUALITY 58

THE 1972 WATER QUALITY AGREEMENT 60
Implementation 62
THE 1978 WATER QUALITY AGREEMENT 64
Implementation 66
Toxics 67
NIAGARA RIVER TOXIC POLLUTION 68

CONCLUSIONS 75

FOOTNOTES 84

PART I. CANADA-UNITED STATES BOUNDARY WATERS

For 3,800 kilometres lakes and rivers form the boundary between Canada and the United States. The St. Croix, the Saint John, the St. Lawrence, the Great Lakes, the Pigeon-Rainy rivers, and the Lake of the Woods make up this discontinuous water boundary. Along the total 8,900 kilometre length of the boundary there are nearly 300 lakes, rivers and streams. Contention over these waters has been a fact of bilateral relations dating from the last century and will certainly remain significant in the future.

The reason water is the source of contention is plain. It is a transient resource that has value in itself, such as for domestic use, irrigation, conveyance of domestic and industrial wastes, hydroelectric generation, navigation and habitat for fish and wildlife. As it has value and as it moves there are conflicting demands on it. Within national jurisdictions the rights to its use and guarantees as to its quality can be assured, though imperfectly, through legal and institutional arrangements. Where the water forms a boundary or flows across the border no overriding authority oversees the rights and obligations of the people using the water. Arrangements must be worked out between the two sovereign governments acting to protect their national interest as they perceive it. Broadly speaking we can assume this interest entails appropriating as much of the value of the resource as possible without jeopardizing relations with the neighbour.

This paper explores the nature of transboundary and boundary water problems with emphasis on the Great Lakes. The intent is to provide a background for understanding the emerging transboundary issues and the constraints and opportunities the federal government faces in responding to them. Part I describes some features shaping boundary and transboundary water issues. (Boundary waters are defined here, as in the Boundary Waters Treaty, as those waters which form the water boundary between Canada and the

United States, such as the Great Lakes, except Lake Michigan, and the international section of the St. Lawrence River. Transboundary rivers refer to rivers crossing the boundary, such as the Red, Columbia, and Yukon rivers. The main institutional features of transboundary waters relations are then discussed. They are the Boundary Waters Treaty of 1909 and the International Joint Commission (IJC). Part II deals with the flows, levels, and quality problems affecting the Great Lakes.

1.1. CANADIAN-AMERICAN TRANSBOUNDARY WATER RELATIONS

Canada and the United States broadly share the same outlook on international responsibilities, resources and environmental values. But there are features of bilateral relations that lead to differences and affect the ease with which disputes can be resolved.

1. Boundary Issues

Broadly the issues may be classified into those in which there is some mutual incentive to cooperate and those in which there is no real advantage for one country to work with the other.

Across the boundary numerous issues arise from particular projects or activities that cause or threaten damage. Both countries are at various times at the receiving end of actual or anticipated spillovers. Many of these issues occur on transboundary rivers. From the Garrison diversion project in North Dakota Canada fears transfer of foreign biota and disease from the Missouri basin to north flowing rivers through the irrigation drainage into the Souris loop or the Red River. The United States fears open pit coal developments in the upper Flathead basin in British Columbia may degrade water quality across the border in Montana, where the river has been recently designated a "wild river".

These spillover issues are difficult to resolve. A project like the Cabin Creek coal development in the Flathead basin or the Garrison project may seem on balance a good idea to the respective provincial or state governments, who can weigh the project's environmental damages against its benefits. The same projects will be seen far differently by people on the other side of the boundary, who only experience environmental damage. Protests against such projects can become unrestrained, especially when

nationalist sentiment adds to the sense of injury. The political energy is directed across the border and is not dissipated by conflict with domestic proponents.

Despite the heat of the protests they may have little effect. If the projects satisfy domestic legislative requirements, the governments will find baseless the charges that the projects violate existing international prohibitions against damage or pollution.

One-way spillovers are mitigated in Canada-United States relations by the long border. About 55 per cent of the 90 significant transboundary rivers flow from Canada to the United States.[1] In one case Canada may be upstream, while in others it is downstream. Canadian government willingness to consider an IJC reference regarding the Flathead River coal development in British Columbia in part reflects the earlier American acceptance of a reference on the the Garrison diversion. Other aspects of relations will come into play, including treaties and other formal and informal arrangements.

In many cases damage occurs in the offending country. The domestic opposition to a project may find support from the neigbouring national government. In the Garrison case the Canadian government supported informally American interests opposed to the project, such as the National Audubon Society. The large American constituency opposed to the project may have made the State Department more responsive to Canadian arguments that the project would violate the anti-pollution provision of the Boundary Waters Treaty. It also agreed to involve the IJC in an investigation of the possible effects. Similarly the Canadian government has found friends it has wished to encourage in issues like Niagara River toxic dump sites and acid rain, though to date with little significant influence on American actions.

In another variant of boundary water issues the countries may work to optimize the benefits from positive spillovers. A regulation dam upstream can have benefits downstream for power production and flood control. By integrating development of a river the two countries enjoy greater economic returns than if each worked independently of the other. The Columbia River dams upstream in Canada and the St. Lawrence Seaway and Power Project were negotiated on this basis. In the last two decades such developments have faded from view for lack of compelling projects and a less sympathetic political atmosphere. Vestiges linger on in some quarters in the appeal of visionary continental scale water transfer schemes.

Another kind of issue concerns boundary water levels. Where water levels and flows are controlled by some regulation work, the IJC generally (though not always) handles the issues with the assistance of its boards of control. Where the IJC does intervene it works out regulation plans that attempt to balance riparian interests. As the waters are shared interest groups may more or less be equally distributed between the countries. The commission will have less trouble finding a 'golden mean' than where the balance of interests differ.[2] In the regulation of the levels of Lake Champlain, for example, Canadian interests sought protection from flooding downstream along the Richelieu while American conservation groups wanted to regulate the lake to protect and enhance wetland areas in New York and Vermont.

Hydro, shipping, lakeshore interests, and environmentalists have different points of view on level regulation for the Great Lakes. An ideal regulation scheme for the lakes has long been the subject of controversy, despite the fact that the vast amount of natural storage provides stable regulation of the lakes. The IJC in its regulation studies found it

impractical and uneconomic to attempt regulation beyond at nature and the existing controls at the outlets of Lake Superior and Lake Ontario provide.

Many of the problems along the boundary result not from single projects or activities having transboundary effects, but from the patterns of industrialization, urbanization, and land use. In the past, rivers like the Saint John, suffered from common abuse of the shared resource. Where the river or lake is equally valued by both countries they share incentives to reverse the process of degradation. However, attaining common objectives may be slow as a result of the involved process of agreement and coordination from among the different levels of government and from the resistence of those interest groups that benefit from existing practices.

The most serious problems affecting the Great Lakes are of this reciprocal nature. Eutrophication and toxic pollution, long range transport of air pollution, and consumptive uses of water present some of the greatest threats to our environmental security and long term welfare. Canada and the United States share the Great Lakes and each suffers the consequences of pollution.

Nevertheless, the disproportionate waste discharged into the lakes by the United States gives the problems some of the characteristics of one-way spillover issues. Canadian initiatives to deal with the Great Lakes problems run into United States dominance and domestic indifference to Canada. This is a major feature of bilateral boundary relations.

2. **United States Dominance**

The United States by the weight of its population, the use it makes of shared water resources, and the thrust of its domestic policy dominates the relationship. While it dominates relations its political interests are

centred elsewhere. On the other hand at least two-thirds of the Canadian population lives within the Great Lakes-St. Lawrence drainage basin.

Americans outnumber Canadians three to one in boundary basins, but ten to one nationally. The relative sparseness, in American terms, of their boundary region gives Americans a different perspective from Canadians of the same boundary regions and water resources. The Flathead case illustrates this point. In British Columbia the upper basin is seen as ripe for coal development. In Montana the river has been classified as a "scenic and wild river", a designation Americans would like Canada to apply to prevent development in the upper basin. There are a number of existing and planned energy, mining and logging developments in Canada close to the border to which the Americans object. Many of the projects have been shelved as a result of the recession. The complaint among American officials in the late 1970s that the United States was downstream in all too many instances have subsided. Nonetheless, the difference remains. Americans tend to see much of the border region as the last remaining accessible frontier. Canadians see it as a corridor for development. The true wilderness areas worthy of preservation are further north.[3]

The Great Lakes basin supports a population of about 36 million. Approximately 7.5 million people live in Ontario. This is a third of the total Canadian population. The American Great Lakes population account for one seventh of the American. The basin is the centre of heavy industry in North America. It generates about a third of Canada's national income, about a sixth of American national income.[4]

Naturally the United States with its larger population and industrial base has historically made and continues to make greater use of the water resources. It accounts for 87 per cent of the approximately 140 cms (4,900

cfs) of water consumed from the lakes (1975 estimate)[5] and discharges 80 per cent of conventional pollutants from treatment plants (total phosphorus 76 per cent).[6] One might assume that the proportion would be similar for toxics and non-point sources of pollution. This presents Canadians with a dilemma. As Munton points out, for the United States it is a modest advantage to have Canadian cooperation in clean-up efforts; for Canada it is a necessity to have American cooperation.[7]

Although the American population in the Great Lakes basin is about five times larger than the Canadian population, in national politics the proportionally smaller American Great Lakes population commands less attention. Great Lakes issues do not have the same high national political priority that such issues have in Canada. The locus of American political and economic power has been shifting to the south and west, and the Great Lakes region has declined in economic and political power. As a consequence, relevant national programs, such as for waste water treatment and sewers, favour the new power centres more than the older communities with their aging industrial and urban base. Moreover, the interest in the region in Great Lakes issues has been unfocused. The eight Great Lake states and their congressional representatives have not in the past developed a community of interest in Great Lakes issues. This is changing.

In the last few years the regional voice in environmental and economic development matters is starting to be heard more strongly in Congress and in executive departments. New political organizations, like the Council of Great Lakes Governors and Northeast-Midwest Congressional coalitions, have been formed with a mandate to consider Great Lakes issues and represent regional interests.

The fact remains that Canada is dependent on the United States taking the initiative in issues of reciprocal damage. Where the political force is

lacking, as it is for issues like acid rain, the Canadian government can do little. Congressmen see few votes in approving measures designed mostly to protect Canadians from the consequences of American practices, especially when they have their constituent's support. If important interest groups in the United States oppose Canadian demands and there are few interests allied to the Canadian position there will be no domestic pressure for the American government to respond favourably. However, the American government may be more responsive if there are balancing interests or the American interests responsible have little political significance. In such situations the United States will be more responsive to Canadian diplomatic initiatives and principles.

A case can be made that for major issues, like Great Lakes clean-up or acid rain, international agreements will only be as progressive as domestic policy. In other words the progress in Great Lakes clean-up is the result of American programs applicable nation-wide. From this perspective the two water quality agreements have little to do with the progress made in the clean-up of the Great Lakes. This view finds support more in the United States than in Canada.

Paradoxically the inwardness of American policy formulation, with its relative insensitivity to Canadian concerns, combined with the dominant position along the boundary can make for expansionist transboundary policies. This arises from the different approach to environmental issues adopted in the United States.

3. Management Philosophies

The two countries view the boundary and boundary waters differently. Canada starts from a strong position of territorial integrity. Canada wants to be free to do as it pleases subject only to meeting agreed upon

obligations and principles at the boundary. The Boundary Waters Treaty guarantees equal and similar rights in the use of boundary waters. In most boundary rivers the flow is divided equally for purposes such as hydroelectric power. In water quality the two countries should be able to have an equal assimilative capacity. Each side should shoulder the responsibility of ensuring the agreed upon quality standards are maintained along the boundary.

The sheer weight of American use of boundary waters would make the Canadian position difficult to implement in practice, even if the American government accepted the Canadian position. While the United States accepts equality for uses such as hydro power, it makes no allowance for its greater consumptive use of water, which has the effect of reducing the power that can be generated in Canada.

It adopts a different approach to Canada with regard to water quality. Under the Clean Water Act (PL92-500) point source standards are established and implemented regardless of the location or condition of the receiving waters. The approach stresses equity. Waste dischargers in one part of the country face similar measures as those in another. The emphasis is on process in the belief that if the process works properly the environmental objectives will be achieved. The American government wanted Canada, in renegotiation of the Great Lakes Water Quality Agreement, to adopt this approach and the standards under the Clean Water Act. Applied to boundary water issues the equity approach favours an equal commitment and uniform regulatory policies and disregards the quality of the water at the boundary.

Canadian governments find the approach inappropriate. In total, Canada is a minor contributor to pollution of the Great Lakes and the application of the American approach would be costly and possibly drive out of business many older and marginally profitable firms. The approach also ignores

Canadian claims to its equal share of the Great Lakes as a waste receptor or equal assimilative capacity.

In domestic environmental management Canadian governments tend to work from the objectives back to the source of the problem. Standards and guidelines may be adopted but they do not have the force of law. Discharge licences are negotiated taking into account the standards and guidelines. The terms and conditions of the licence are legally enforceable. As the process is informal and does not rely on the courts for enforcement in the same way as in the United States it is not always clear that appropriate measures are being undertaken.

In international negotiations American negotiators often are sceptical that Canadian industrial waste dischargers are making the necessary effort to meet agreed upon objectives. They would prefer their approach that stresses equitable or equal commitment to further abatement and is open to legal challenge. It also ensures that one region does not gain a competitive advantage from lax environmental regulation. Canadians tend to see the pursuit of domestic legislation in international negotiations as an extraterritorial extension of United States legislation. The American position in the 1978 negotiations was somewhat reminiscent of 1960s views on "a continental resources policy."

Apart from the difficulty coordinating Canadian policy among the federal government and the provinces a fundamental question is raised: does joint management of common resources call for uniform regulatory policy by the two countries?[8]

More generally, boundary environmental and water management poses very difficult problems that raise questions about how successful the government can be in ensuring environmental security. Clearly the important emerging

boundary water and environmental issues will deal with the consequences of ingrained practices in water use and effluent management. Changing these practices will be costly and will face stiff political resistance. In face of disproportionate American abuse of boundary environmental resources what scope does the federal government have to protect Canadian territorial integrity and pursue an independent environmental management approach?

4. **Federalism**

The federal structure of Canada places additional constraints on the federal government in bilateral relations. The American system gives its federal government a leading role in environmental issues, while in Canada the provinces own and have the responsibility of husbanding their natural resources.

The Environment Canada - Ontario Region submission to the inquiry points out the problems with regard to the Great Lakes Water Quality Agreement. The federal role in implementing the objectives of the agreement has been largely research and surveillance while the province is responsible for management and control through its own non-enforceable guideline approach.

> The lack of legally enforceable water pollution limits has created problems in Canada's dealing with the U.S. regarding the Great Lakes. Lacking a federal framework of legally enforceable standards comparable to that which exists in the U.S., the federal government and departments dealing with water issues cannot directly implement programs to meet signed treaty and agreement objectives and obligations undertaken with the U.S. regarding Great Lakes water quality ... there exists no current mechanism where DOE can coordinate federal and provincial water management activities of the region.[9]

The constrained power of the federal government best equips it to adopt critical rather than positive positions with regard to transboundary

problems. It can freely criticize actions and activities that threaten Canadian interests. But it is less well equipped to initiate positive bilateral policies requiring domestic legislation or programs in both countries, unless it has the full cooperation of the relevant provinces. Similarly it has difficulties responding to initiatives from the American government. The position of the federal government is particularly awkward when the provincial government is the source of a problem. A provincial government may not recognize that its actions undermine a position the government is trying to establish overall or with regard to issues in another part of the boundary.

1.2. THE BOUNDARY WATERS TREATY

The framework guiding boundary water relations is provided by the Boundary Waters Treaty of 1909. The treaty, one of the first Canada negotiated (though through the British government), reflects the federal government's concerns and uncertainties in its relations with the United States, the boundary water issues of the time, and the American government's preoccupation with territorial sovereignty. The treaty does not address some of today's concerns, but there is little interest among the governments in changing it. It has proven adaptable to changing condition along the boundary. The strength of the treaty is in the basic principles that guide the two national governments in boundary water issues and the institution it created, the International Joint Commission.

For most of the nineteenth century only two types of boundary issues had been important -- delineation of the boundary as Canada and the United States expanded westward, and navigation. Beginning with the Treaty of Paris in 1783 a succession of treaties and agreements delineated the boundary and set out navigation rights.[10] Around the turn of the twentieth century North America entered into a period of unprecedented economic and population growth and new issues were added to boundary agenda. Competition developed for irrigation water from transboundary rivers in the west and power developers looked to tap the considerable hydroelectric potential in boundary rivers. In 1898 Britain, Canada, and the United States formed the Joint High Commission to resolve the controversies that troubled Canada-United States relations. At that time not one of the issues concerned boundary water problems. By 1907 a number of problems claimed attention, including apportionment of the St. Mary River in the west for irrigation, power schemes affecting the flow over Niagara Falls, water level issues along the Minnesota-Ontario boundary and Lake Champlain, the Chicago diversion, and power proposals on the St. Marys River.

All the parties saw the need for a permanent arrangement to replace the existing approach relying on ad hoc commissions and involving a cumbersome diplomatic triangle from Ottawa to London to Washington. In addition, Canadian politicians and officials wanted more direct contact with Washington. They felt Britain did not represent well Canadian interests to the United States government. On the other hand they were unpracticed in diplomacy and uncertain of whether Canada would be treated as an equal in Washington. In light of this weakness they thought a judicial arrangement had the best chance of putting Canada on "an equal footing" with the United States. Prime Minister Laurier argued for an impartial commission directed by agreed upon legal principles.[11] Canadian negotiators wanted jurisdiction for the commission to cover all the waters potentially subject to international attention, that is boundary rivers and tributary rivers and lakes flowing into them (including Lake Michigan).

In 1905 the three governments created the International Waterways Commission, as a purely investigatory body to handle issues in the Great Lakes-St. Lawrence Basin. The American government recognized that the commission was too limited in scope and a new organization was needed. However, the government favoured this type of investigative organization in which at the request of the two governments the commission would set out the facts of the issue, make recommendations, and then retire to leave its settlement to the two governments.

The Americans opposed arrangements that might limit American sovereignty. This was the period of the Harmon Doctrine, the argument in international law advocating absolute territorial sovereignty in which an upstream country had the right to use the water of a transboundary river in its territory, without regard to downstream claims. The government could be comfortable with the doctrine in its dealings with Mexico where the United States is upstream on both the Rio Grande and Colorado rivers, but it was

not in such an enviable position along the length of the Canada-United States border. The Secretary of State of the time, Elihu Root, did not feel that the issues being raised along the boundary gave the United States any particular advantage.[12] The perceived reciprocal vulnerability provided an opening for negotiation and compromise.

The Boundary Waters Treaty is the fruit of that compromise. Canada compromised by accepting in large part the territorial sovereignty argument, the narrowly construed definition of boundary waters, and the consequent limited jurisdiction permitted the IJC. The United States compromised by accepting water use principles and authority for the commission applicable to certain types of issues in boundary waters. The treaty was just barely politically acceptable to both Canada and the United States.

The Boundary Waters Treaty of 1909

Navigation. The treaty states that "navigation of all navigable boundary waters shall forever continue free and open for the purposes of commerce to the inhabitants and to the ships, vessels, and boats of both countries equally ...". Lake Michigan, though not a boundary water is also open to navigation by Canadian vessels. Regulations and tolls for use of canals may be imposed, but they are to apply without discrimination to either country's vessels (Article I).

Until power production and irrigation became important uses of water about the turn of the century the principle focus of international water law had been on navigation rights. One of the main pressures for a treaty was to secure navigation rights. However in the negotiations the navigation aspect became of less concern than other uses of boundary waters; even still navigation rights retain prominence in the treaty.

Boundary Waters. Boundary waters are defined in the Treaty as those "waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms and inlets thereof ...". Excluded are "tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or water flowing from such lakes, rivers, and waterways, or the waters of river flowing across the boundary" (Preliminary Article).

Canadian negotiators wanted tributary waters, such as Lake Michigan, and transboundary rivers included in the definition of boundary waters. The United States argued at first for no definition of boundary waters.

Territorial Sovereignty. The first part of Article II expresses in effect the Harmon Doctrine. It reserves for each party "the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line which in their natural channels would flow across the boundary or into boundary waters, ...".

This clause was the hardest of the treaty for Canadians to accept. It raised all their fears and suspicions. It exposed a large area of potential conflict without legal principles or an impartial arbitrator to restrain American water exploitation.

To palliate Canadian fears the right to unrestrained use by an upstream country on a transboundary river was qualified. First, it made upstream diverters open to redress from individuals or groups injured in the downstream country. The clause reads "... but it is agreed that any interference with or diversion from their channel of such waters on either side of the boundary, resulting in any injury on the other side of the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as

if such injury took place in the country where such diversion or interference occurs; ...".

Second, in keeping with the emphasis on navigation rights the article adds that it is not intended that either state "surrender any right, which it may have, to object to any interference with or diversions of waters on the other side of the boundary the effect of which would be productive of material injury to the navigation interests on its own side of the boundary."

Prime Minister Laurier mistrusted the article, as did the Conservative Party opposition; but to have agreement at all in face of the firm American stand on this issue Laurier accepted it.

With the compromise on the definition of boundary waters and territorial sovereignty principle of Article II the American negotiators were willing to concede to Canada many of its points.

The IJC. Article VII establishes the International Joint Commission. It is to be composed of six commissioners, three from Canada and three from the United States appointed by the Governor in Council and the President respectively.

IJC Approval Authority. Articles III and IV give the International Joint Commission its quasi-judicial function. Article III requires approval for works causing obstructions or diversions of boundary waters affecting the natural level or flow of boundary waters from the respective government and the IJC. Joint government actions and navigation improvements undertaken by one country but not materially affecting the level or flow on the opposite side of river, and ordinary use of boundary water for domestic and sanitary purposes are exempted.

Article IV extends the IJC approval requirement to obstructions downstream of the boundary that raise the natural level of waters at the boundary.

Principles. The principles upon which the IJC is to base its approvals are set out in Article VIII. Each country will have "equal and similar rights" in the use of boundary waters. An order of precedence is set out for new water uses (existing uses were not to be disturbed):

1. uses for domestic and sanitary purposes,
2. navigation, including the service of canals for the purposes of navigation,
3. uses for power and for irrigation.

The commission is given the power to suspend the equal division for temporary diversions in boundary waters if local conditions warrant. For such waters the commission can also make approval conditional upon construction of remedial works and provisions to protect and indemnify against injury interests on either side of the boundary. In cases where a downstream obstruction raises the water level at the boundary approval may be subject to the commission's approval of adequate provisions for the protection and indemnity of all interests on the upstream side of the border.

A majority of the commission has the power to makes decisions. Where the vote is divided equally the two governments will settle the issue themselves.

References. The commission is given investigation duties under Article IX. It is "authorized in each case so referred to examine into and report upon the facts and circumstances of the particular questions and matters referred, together with such conclusions and recommendations as may

be appropriate, subject, however, to any restrictions or exceptions which may be imposed with respect there to by the terms of the reference."

This gives the IJC the type of function the United States felt most appropriate for a boundary water commission.

Arbitration. In line with the legal approach Canada favoured an arbitration function was given to the commission. The United States was not enthusiastic, but to be conciliatory Root accepted it while protecting United States' interests by making American participation in any submission subject to the "advice and consent of the Senate."

Special Agreements. The Treaty also contains two special agreements. Article V permits the United States to divert 20,000 cubic feet per second of water at Niagara and Canada 36,000 cfs for power production. The provisions remained in effect until a separate treaty was signed for the Niagara in 1950. Article VI apportions the Milk and St. Mary Rivers flowing between Alberta and Montana. The IJC is to administer the apportionment.

Prohibition Against Pollution. Article IV also contains the important pollution clause - "boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."

The principle follows directly from the first draft of the treaty. The American negotiator, George Clinton, explained to Elihu Root, the Secretary of State that "it was inserted to take care of cases which are likely to arise in the future when the Northwest becomes more densely populated". He added: "perhaps the language is too strong".[13] The injunction was strong for the time, though the Canadian negotiator did not think it important. He was ready to placate the demands in the American Senate by conceding that it

would only be enforced in more serious cases.[14] It is enough to say that the prohibition was designed to prevent pollution. But many of the major pollution problems occur gradually. They are thus only apparent when the problem is already entrenched and not easy to remedy.

The Boundary Waters Treaty in Practice

The lasting significance of the Boundary Waters Treaty is the principles it established and the creation of the IJC. Some aspects of the treaty that seemed important at the time have not been applied while others have become dated.

The principles of note in the Treaty are:

1. Each country has exclusive jurisdiction over the use or diversion of transboundary rivers or rivers flowing into boundary waters; if such diversions or use cause injury downstream the courts of the upstream country are open to inhabitants from the downstream country.
2. Both countries have equal and similar rights in the use of boundary waters. More broadly it establishes the principle of equality in the operation of the IJC.
3. Boundary and transboundary waters shall not be polluted on either side to the injury of health or property in the other country.

For Canada the most troubling part of the Treaty was the Article II provisions enshrining 'territorial sovereignty. In practice neither government has attempted to exercise its Article II rights. Ironically debate on the issue was most heated in the 1950s during the Columbia River negotiations when Canada as upstream riparian on the Kootenay and Columbia Rivers contemplated unilateral diversion. Today as Bourne says the right "is still alive to some extent in Canada, surviving but largely ignored when the time for making decisions is at hand".[15]

Canada sought a kind of judicial tribunal to establish a "court outside politics" to even up the odds and protect Canada from American special interests and powers. In this regard the IJC was a given an arbitration function in which it would act to settle disputes submitted to it by the two governments. However, once the commission was created the Canadian government (now Conservative) rejected the the judicial approach to the commission. The IJC has never been called upon by the governments to exercise its arbitration function.

The priorities in the treaty reflect the uses of the time. It was fortunate the treaty was negotiated during a period when new demands, such as hydroelectric generation and irrigation, were being placed on water. Otherwise, it may have reflected even more narrowly navigation rights. Nevertheless, in light of present interests in recreation, fisheries, wildlife and other environmental issues the treaty does not address well current concerns.

The treaty achieved one of the main Canadian objectives. It put Canada on an equal footing with the United States. Article VIII makes the point that each side has "equal and similar rights" in the use of boundary waters. The negotiators established the principle of equality, but the history of boundary relations shows that it is difficult to effect in practice, particularly with regard to domestic and sanitary use in the Great Lakes, or in the words of present concerns, water consumption and pollution.

The anti-pollution provision of Article IV suffers the same difficulty. The treaty is designed to deal with discrete issues in which the IJC can issue an Order of Approval or one country can invoke principles to prohibit an act or potential act in the other country that will have transboundary effects. The problem with issues like consumption and pollution is that they arise from numerous acts, none of which may have any significant transboundary

impact, though over time the total effects are large. Since the United States has a larger population and a greater industrial concentration around the lakes it will have a disproportionate consumption and pollution impact.

More positively the principles offer shared values from which to approach the problems. Both sides agree that they should not pollute to the detriment of the other side. To some extent that focuses the issue on questions of fact and permits a more functional and less political examination of the issue. The IJC is often asked to establish the facts, that is whether the problem exits and how serious it might be. However, as the long history of IJC studies of Great Lakes pollution indicate determining that a problem exists is not enough.

Apart from the principles the most lasting and still vibrant legacy of the Boundary Waters Treaty is the IJC.

1.3. THE INTERNATIONAL JOINT COMMISSION

The six commissioners are appointed and serve at the pleasure of the governments. They practice a 'collegial' approach in the sense they come to collective decisions as individuals and not under instruction or as representatives of their governments. Among international river commissions such an approach is unique to the IJC. The commission seldom fails to reach a decision because of splits along national lines. Nevertheless, the commissioners will bring national points of view to bear with varying degrees of force. These perceptions of national interest have to be reconciled to arrive at a collective decision. The long period experienced in drafting reports to the two governments in part reflects the problems of reconciling perceptions of national interest with the collegial approach. Overall, the character of the commission - for better or worse - will reflect the personalities and capabilities of its commissioners and the care the respective governments have given in selecting qualified and capable appointees.

The commission has a secretariat in Ottawa and Washington with a staff of engineers, lawyers, environmentalists, administrative officers and support personnel. They advise the commission, coordinate its activities, and provide continuity in its operations.

The commission creates boards, appointed from qualified experts in both countries, to conduct its investigative, surveillance and supervisory activities. The Report to December 1982: International Joint Commission listed 27 IJC international boards -- 13 boards of control that supervise works controlling boundary waters, 4 pollution advisory boards, the Great Lakes Water Quality and Great Lakes Science Advisory boards formed to help implement the Great Lakes Water Quality Agreement, and 8 investigative-engineering boards that conduct investigations assigned to the commission.

The investigative boards operate during the life of reference, the others are permanent or semi-permanent fixtures.

The board members are seconded from appropriate departments within the various federal, state, and provincial governments to serve in their personal and professional capacity under the direction of the commission. In their work they are not responsible to the departments or agencies employing them, nor are their employers committed by the actions of individual members or the boards as a whole. The boards operate as a single unit under joint chairmen in the same manner as the commission. If necessary, as is generally the case in references, the boards establish working groups to help in carrying out the technical investigations. The boards report to and are responsible to the commission. The boards' reports are reviewed by technical staff from the commission. The staff assists the commission with the technical aspects of the work, but it does not conduct its own independent investigations.

The practice has the benefit of securing the services of the most knowledgeable and appropriate professionals associated with the issues at little direct cost. In investigative-engineering boards the investigations are carried out by people in the relevant government departments. The boards' reports reflect the conclusion of low level negotiations among the technical experts and prepare the way for final acceptance in governments of the commission's reports. In the more permanent boards of control and pollution advisory boards the annual or semi-annual meetings provide the opportunity for the counterpart technical people on either side of the boundary to maintain contact.

The practice has drawbacks, particularly for investigative boards. The members must wear 'two hats' working for the commission and their departments. They cannot work full-time on the IJC studies and they may be

shifted to new jobs. The lack of full time investigative members and rapid membership turnover lengthens the period of the boards' investigations. The board members also face possible conflict of interests between giving their best technical advice to the commission and representing their departments.

The alternative to using government staff as board members is to grant to the commission a large enough budget to hire its own professionals for its investigatory work. As will be noted in discussion of the Great Lakes Water Quality Agreement, the governments have not been willing to let the IJC develop that capability. Under the present arrangements the governments can monitor the technical work of the commission.

The Work of the IJC

The commission has opened 61 dockets concerning order of approval (Report to December 1982). They are for about 32 different developments, concerning construction and maintenance of dams, changes in levels and flows, diversion, obstruction and remedial works. Many of the orders build on or are amendments to previous applications. Of the 32 different developments 20 are for dams of which 14 are hydroelectric. There are in addition three references concerning hydro projects for a total of 17 hydro dams that have been or are still in operation in transboundary waters.

Many of the projects are small scale or changes and extensions to previous applications. However, orders of approval do apply to major projects, like the St. Lawrence power application, and regulate many of the largest water bodies. Lakes Ontario, Superior, Kootenay, and Rainy Lake all have dams at their outlets regulated by IJC orders and supervised by IJC boards. Nevertheless, most of the applications are for straightforward small single-use projects.

The commission has been given 44 references, concerning regulation of levels and flows, water pollution, air pollution, river basin development studies, water apportionment, and other issues such as the problems of Point Roberts, Washington. About two thirds of the references are for either regulation of flows and levels or water pollution.

References tend to be more complex, time consuming, and requiring greater financial and manpower resources than orders of approval. In recent decades the references have demanded investigation of multiple-use issues and required consideration of a wide range of factual, technical and policy issues.

The nature of the work of the IJC has changed greatly in the last two decades. In the period to about 1950 the commission dealt with many small and some major works affecting boundary levels and flows. It also handled a number of apportionment issues. Many of the boundary waters have control works and as a result these types of issues have become less important, though the commission retains an important continuing supervisory and surveillance role through the boards established to oversee the operation and maintenance of these works or the apportionment regimes. For example the commission was engaged in five apportionment references in the west, but the last such reference was in 1948. However, boards of control are still in operation. From the Souris-Red River reference the commission has a standing invitation to investigate and apportion transboundary streams east of the Milk River drainage basin in Alberta up to and including the Red River. Apportionment studies of the Poplar River in the late 1970s were carried out under this standing invitation.

For a time the two governments were interested in cooperative development of transboundary resources. The commission made about 9 investigations ranging from Passamaquoddy tidal power to integrated development of the Pembina River. The most notable reference of this kind

was for the Columbia River; it is also the only one that culminated in any actual development. The era of 'great works' peaked in the 1950s and since 1962 there have been no further development references.

In recent decades the commission has become increasingly involved with problems associated with Great Lakes levels regulation and management, air and water pollution in the Great Lakes region, and transboundary environmental impact issues. The lake levels issues have led to a semi-permanent investigative role beyond its ongoing regulation of Lakes Superior and Ontario. The 1964 lakes levels reference was completed in 1976. The governments accepted the commission's recommendation and gave it references in 1977 to study Great Lakes Diversion and Consumptive Uses and Lake Erie Regulation. The commission's final report on diversions and consumptive uses is expected to be released to the governments by the spring of 1985.

The commission's investigations into Great Lakes water quality have given it new responsibilities. The 1964 Great Lakes water quality reference led to the 1972 and 1978 Great Lakes Water Quality Agreements. The agreements greatly expanded responsibilities for the commission. In fact, the commission has become so heavily involved in Great Lakes issues that there is a danger of it becoming thought of as a Great Lakes rather than a boundary wide institution.

The Article IV prohibition against pollution has a positive effect on the planning of projects located near the boundary. All levels of government recognize the obligation not to permit projects that cause transboundary pollution. They do disagree, however, on what constitutes pollution and what the impacts of a project located near the boundary might be. The IJC has been asked to determine the environmental impacts from proposed projects. The impacts are described in physical, biological and social terms. One of the last references to the commission was to study the

transboundary impacts of the Poplar River thermal power plant in Saskatchewan. After an eight year hiatus the next reference given to the commission was an investigation of the transboundary impact from coal development in the upper Flathead basin in British Columbia.

In line with popular and government concerns and current boundary water issues the commission has developed a decided environmental orientation that contrasts with the largely engineering and legal outlook of the early years. Some commissioners and environmental groups would like the commission to evolve further into a role as the guardian of the transboundary environment.

Boundary Waters Treaty, the IJC, and Reform

The Boundary Waters Treaty was signed in 1909. The priorities in the treaty do not include some of the important ones of today. Fisheries, recreation, in fact the present concern for environmental quality are omitted. The prohibition against transboundary pollution was in advance of its time, but it gives the IJC no power and is inadequate to stop incremental pollution of boundary waters.

Despite the recognized limitations of the treaty there are no strong demands for a new treaty -- certainly not from either government. Even the activist former Chairman of the Canadian Section of the IJC, Maxwell Cohen, regarded the treaty as "untouchable".[16] There is the belief that it would be virtually impossible to negotiate as good a treaty today. The treaty has proven to be a 'living instrument', though somewhat arthritic in parts, capable of adapting to changing conditions.

There has been more interest in reforming the IJC. The interest has been shown more by activist commissioners, like Maxwell Cohen, the interested public and academics than by government. There is a strong

feeling the commission could build upon its strengths to become a more effective instrument for boundary environmental protection and management. The strength of the commission lies in a number of areas.

1. The commission performs under Articles III and IV valuable administrative and quasi-judicial tasks in handling a wide range of minor and major boundary level issues. Of less importance now than formerly the commission's work is, nonetheless, important in relieving the governments of issues not well suited to normal bilateral negotiations.

2. This work and other tasks performed in references and by its boards have given the commission the experience and legitimacy in dealing with boundary issues, and has given the commission a reputation of impartiality.

3. The IJC is a valuable arbitrator of fact. In contentious boundary references where neither side has full confidence in the other's facts the commission has the reputation, through its board investigations, of being able to determine and win acceptance of the facts of the issue -- the critical first step in successful negotiation of technical issues.

4. It is a valuable mediator of policy. The commission in its reference investigations has an international perspective, which considers boundary issues from each country's position and from its own concern for solutions to problems without regard for the boundary.

5. Under the umbrella of IJC boards most of the top water managers in both countries come together regularly. This has created an informal network of contact among government officials and experts that facilitates understanding of each government's positions, notice of impending actions that may have transboundary effects, and importantly in reference boards,

lays the groundwork for subsequent international agreements following completion of the inquiry.

A wide range of reforms has been suggested by various people who have studied the commission. Some seek to improve the performance of the commission by such reforms as better staffing, greater formalization of the qualifications, terms and duties of the commissioners, or more secure and satisfactory funding arrangements from the governments. Other types of reforms concentrate on increasing public participation and public information programs. The IJC relations with legislators and government departments are the subject of other suggested reforms. The IJC is seen as an institution that should have a mandate to protect and manage the boundary environment. Many reforms suggest expanding the commission's jurisdiction and authority in order that it might more effectively carry out this role, e.g. through power to carry out its own investigations, establish standards, co-ordinate and participate in government environmental and other water oriented studies and programs, and licence waste dischargers. The more ambitious of these reforms anticipate the commission having limited supranational authority.

Many of these reforms reflect weaknesses experienced in the commission's operations. Others reflect the limitations of the commission's mandate and weakness, or perceived weaknesses, of the governments in responding to problems along the boundary. Some are sensible and may be feasible. Others fail to account for the political pressures that exist in bilateral relations.

Reform of the IJC raises the question of what role should the commission have and, given the political pressures that exist in bilateral relations, what role will the governments allow it to have?

Both governments have managed to keep their enthusiasm for reform in check. In fact they have rebuffed requests of the commission for a modest expansion in its authority. In the early 1970s the work of the IJC grew greatly and its duties increased particularly under the Great Lakes Water Quality Agreement. In this atmosphere it seemed that the commission might increase its jurisdiction significantly and some commissioners actively advocated a more expansive role for the commission. In the mid 1970s the commission wished the governments to submit to it plans and information on actions that might affect boundary water levels (in this case American plans for the St. Mary's ice boom). In another instance IJC asked whether the commission might be used in some way in ensuring "notice and consultation" provisions between the governments. The governments were united in their opposition to the commission's requests.[17]

It was in this period also that the Regional Office of the IJC in Windsor, established under the 1972 Great Lakes Water Quality Agreement, came under attack. The office was growing rapidly and had the potential to undermine the IJC Boards as principle source of information and interpretation to the commission. In the 1978 Agreement the role of the regional office was severely limited to serve as a secretariat to the boards and to carry out public information programs of the commission for the Great Lakes.

Munton recorded officials in the late 1970s as characterizing the relationship between the governments and the commission as one of "fundamental distrust". The commission or some members were thought to be "empire building".[18] As the commission's work expanded in ever more complex and politically sensitive issues there was a questioning of the legitimacy of the commission in complex environmental issues. "While the IJC involvement in boundary waters questions narrowly defined is accepted as legitimate, its involvement in continental ecosystem questions broadly defined is not."[19] Pursuing water quality through the ecosystem approach

will lead through many sensitive byways of domestic politics where the commission may not be welcomed or for which, as a non-representative appointed body, it is not equipped.

Not only did the commission have its "wings clipped severely" for trying to do too much in the 1970s,[21] the governments have in recent years been neglecting it. For six months in 1981 there was only one commissioner and it was not until the end of 1982 the commission was again at full strength. The governments have also been under-utilizing the commission. Between 1977 and 1985 the government did not give the commission any new references.

The lack of references may in part reflect government and official attitudes and a lapse in the traditional Canadian government commitment to maintaining a strong and effective commission. It also reflects changes in bilateral boundary relations. Many of the issues that may have been appropriate for IJC references have faded from view. Energy developments - oil refineries, thermal power plants, coal and mineral exploitation - that were of concern to one or other governments have been set aside with the recession and increased energy conservation. Moreover relations between Canada and the United States have been 'hard nosed' and less sympathetic to joint problem solving approaches.

While the suspicion of the late 1970s may have lessened today, it is clear governments have a conservative view of the commission's role. In the words of one American official "the IJC is a fine institution whose usefulness should not be exaggerated." The governments see it as a tool useful in some circumstances, but not in others. They want to employ it as they see fit, that is, when its use will be most appropriate with regard to domestic issues and bilateral relations. They do not want the commission to have authority that might allow it to interfere with their sovereign rights to solve boundary problems to their best advantage.

PART 2: GREAT LAKES ISSUES

The Great Lakes can provide a case book of most water problems. Below is a list of current and emerging problems afflicting the lakes. Some of the problems are the subject of national and international action. Others are latent issues, that is projects or activities that are not currently the subject of attention but which have been in the recent past and may well be of concern in the future. A number of issues are just emerging and there is insufficient scientific information to indicate their seriousness or suggest appropriate preventative or remedial measures. The state of progress or concern is indicated in brackets.

GREAT LAKES ISSUES[21]

Water Quality

- o discharge of organic waste - BOD and COD problems (good progress)
- o discharge of raw sewage (good progress)
- o dumping of acutely toxic substances (good progress)
- o controls on dumping of mine tailings, ashes, sawdust, slaughter wastes (good progress)
- o waste discharge from ships (good progress)
- o controls on dredge spoils from harbours and channels (good progress)
- o control of phosphorus loadings through detergent bans and waste treatment (moderate progress)
- o loadings of moderately toxic industrial chemicals (moderate progress)
- o management of waste heat from thermal power plants (poor progress)
- o control of urban storm water runoff (poor progress)
- o limiting gross industrial and municipal waste discharges to the St. Lawrence (moderate progress)
- o leaching of toxic substances from chemical dump sites and from other sources (poor progress)
- o control in agriculture of runoff of pollutants and nutrients (poor progress)

- o controlling the movement and trade of toxic compounds like PCBs (moderate progress)
- o sediment accumulation of polynuclear aromatic hydrocarbons PAHs (of concern, needs more scientific information)
- o intense synergistic interaction of persistent contaminants (of concern, needs more scientific information)
- o persistent and unknown effects of dioxins and other contaminants on aquatic life and on man as a consumer (of concern, needs more scientific information)

Diversion and Consumption

- o Chicago diversion (latent)
- o large scale diversions in and out of the basin (latent)
- o consumptive use of water by cooling towers and irrigation (emerging issue)
- o consumptive industrial and urban use of water (emerging issue)

Fisheries and Wildlife

- o good to moderate progress on most fisheries and wildlife issues

Coastal Zone Management

- o destructive channelization practices (moderate progress)
- o erosion control from urban development and construction sites (poor progress)
- o protection and restoration of wetlands (poor progress)
- o mineral and oil extraction from under the lakes (emerging issue)

Accidents

- o nuclear power (little progress)
- o accidents in transportation of hazardous substances (little progress)

Climate

- o climate warming through the greeenhouse effect of CO_2 (of concern, needs more scientific information)
- o weather modification (latent)

Navigation

- o winter navigation in connecting channels and harbours (latent)

The 1978 Great Lakes Water Quality Agreement recognized the lakes as an ecosystem. There has always been a recognition that what a user or a government permits in one part of the basin will have consequences elsewhere. The downstream states and the Canadian government have long opposed increases of flow from the Chicago diversion because of the effects of lower levels and flows on hydro power. With improving scientific techniques we are beginning to detect and appreciate some of the subtle links between diffuse discharges of toxic substances and bioaccumulation in fish and wildlife, and possible threats to public health. Our scientific knowledge is still limited and not all the linkages are understood, nor do we yet understand the ramifications of possible climatic warming and all the implications that will have for use of the Great Lakes. In an inter-jurisdictional setting the question is what does ecosystem management require and imply for the different governments? While a bilateral approach is recognized as necessary it is less clear what might be the most effective, efficient, equitable, and politically feasible institutional arrangements to grapple with the complex sets of problems that beset the Great Lakes.

To illustrate the international implications of Great Lakes problems, the following section presents some issues concerning levels and flows that are or have been recently the subject of bilateral concern. Section 2.2. discusses the Great Lakes Water Quality Agreement and the current bilateral problems in dealing with Niagara River toxic wastes.

2.1. GREAT LAKES FLOWS AND LEVELS ISSUES

DIVERSIONS

There are five significant diversions within the Great Lakes. The Long Lac and Ogoki diversions direct on average 158 cms (5,600 cfs) of water from the Hudson Bay drainage basin into the Great Lakes. The Welland Canal diverts water at a current average annual rate of 260 cms (9,200 cfs) between lakes Erie and Ontario. The New York State Barge Canal takes about 20 cms (700 cfs) from the Niagara River and returns it to Lake Ontario. The Chicago diversion drains on average 90 cms (3,200 cfs) out of the basin.

The international issues concerning diversions are:

1. lake levels regulation,
2. crediting flows for hydro power generation from diversions into the Great Lakes system, such as the Long Lac-Ogoki diversions,
3. possible increases in diversions out of the basin at Chicago,
4. speculation about possible large scale diversion schemes to supply water to the arid regions in the United States.

With regard to lake levels regulation the IJC's International Great Lakes Diversion and Consumptive Uses Study Board noted the 'reservoir effect' of the lakes and the long lead time needed for regulation actions to take effect. The size of the lakes and the limited discharge capacities of their outflow rivers means that extreme high or low levels and flows persist after the conditions causing them have changed or ceased. For example, it takes two and one-half years for only half of the full effect of a continuous supply change to Lakes Michigan-Huron to be realized in the outflows from Lake Erie. The board found that it was possible to alter diversions to reduce outflows and extreme high lake levels, but its analysis showed that a residual effect would be felt on lake levels after a particular diversion returned to its pre-modification rate. As a result of the the long lag time the residual effect would last

beyond the period of high lake levels and in some cases impact on extreme low level conditions. Such management would result in a net economic loss and some unquantifiable environmental impacts. The board concluded it was not feasible to alter diversions to raise the extreme low lake levels and outflows.[22] The IJC is expected to agree with these findings in the report to be released in spring 1985.

MAP I: GREAT LAKES DIVERSIONS

Long Lac-Ogoki Diversion

The Long Lac and Ogoki diversions, completed by Ontario Hydro during the second world war, divert water flowing north into Hudson Bay to Lake Superior. From 1943 to 1979 the average flows have been about 41 cms (1,440 cfs) from the Long Lac route and 117 cms (4,150 cfs) from Ogoki.

In an exchange of diplomatic notes in 1940 and 1941 the United States agreed to credit for 141 cms (5,000 cfs) of that flow for Canadian power production at Niagara or through the Welland Canal. The Niagara Treaty of 1950 confirmed the arrangement by extending indefinitely the 1940 note.

Canadian diplomatic efforts in the 1930s and early 1940s sought recognition of the right of the country diverting water into the Great Lakes to its use downstream. The United States government agreed in principle and it was incorporated into draft treaties (e.g. The 1932 St. Lawrence Deep Waterway Treaty and the 1941 Great Lakes-St. Lawrence Basin Treaty). Since the treaties were not ratified by the United States Senate it never became official policy.[23] As a consequence, in the St. Marys River the diverted flow is divided equally and Canada loses half of the Long Lac-Ogoki waters to the United States for power generation. The flow is also divided equally on the international section of the St. Lawrence, but Canada and Ontario agreed to the equal division in negotiations for the St. Lawrence power projects. Moreover, Canada loses at Niagara also. The diversions, as noted above, have averaged 158 cms. The 18 cms above the 140 cms is shared equally between Canada and the United States, and thus Canada loses a further 9 cms of its water and the power that can be generated from it.[24]

In the late 1970s the federal government raised the issue of full use of the diverted waters on the St. Marys River. The United States takes the position that flows not otherwise committed under agreements are shared

equally between the countries. As noted below in the Niagara and Sault sections, the United States government argues that if one country does not fully utilize its half share then the other country, if it can, is entitled to use the remaining portion.

Chicago Diversion

The outflow of water from Lake Michigan through the Chicago Sanitary and Ship Canal into the Mississippi River system has been one of most long standing bilateral water issues. In fact it was on the bilateral agenda during the negotiations for the Boundary Waters Treaty, but was dropped because it was too contentious. It has remained a sore point in relations ever since.

The diversion canal has a capacity of about 340 cms (12,000 cfs), though to avoid downstream flooding the more practical average maximum is about 246 cms (8,700 cfs). The canal offers navigation, sewage dilution and downstream power benefits. Until the 1930s, Chicago maintained a flow in the range of 198 cms to 283 cms (7,000 cfs to 10,000 cfs), which violated its federal government permit and Supreme Court orders limiting the diversion. Canada objects to any increase in the present 91 cms (3,200 cfs). An increase would reduce outflows and cut hydro power generation in the Niagara and St. Lawrence rivers. The effect on lake levels would be minor. Increasing the outflow at Chicago from 91 cms (3,200 cfs) to 246 cms (8,700 cfs) would reduce the mean levels in Lakes Erie and Ontario by 3 to 4 centimetres. Thus the effect on navigation, recreation and other riparian interests would likely be minor.

Periodically proponents of the diversion attempt to increase once again the flows. The last major initiative was in 1976 when Congress authorized a demonstration and study program. It included provisions for increasing the

diversion from 91 cms to 246 cms (3,200 cfs to 10,000 cfs) to study the effects of the diversion in reducing shoreline damage during periods of high lake levels. Canada protested against the proposed trial increase. As in the past, Canadian protests were supported by the downstream states. A United States Corps of Engineers Report concluded that a large diversion would not be economically justified, though there might be justification for smaller increases. The political pressure from Canada, the State Department, and other basin wide interests found effect in the refusal of Congress to fund the demonstration program. Furthermore, in 1980 the Supreme Court in the latest of a number of orders issued a modified decree that limits the diversion to 3,200 cfs.

There is some concern about new accounting procedures initiated by the decree. They might allow Chicago to divert quantities of water in the early part of the 40 year accounting period that it could not replace at the end of the period.

The potential to increase flows will always remain, as will pressure from hydro and navigation interests south of Chicago to make use of the excess capacity. While the issue is for the time being quiescent, as the long history of the controversy suggests, proposals to increase flows will at some point be revived and it will once again return to the bilateral agenda.

Potential Diversions

In reaction to alarm over the declining ground water reserves of the Ogallala aquifer of the high plains states and developments in the coal fields in the west there have been speculative proposals to import water from the Great Lakes. Even more imaginative schemes foresee damming James Bay to create a freshwater reservoir that could be pumped into the Great Lakes and then on to the water short areas. The growing water problems in the United States

southwest and imaginative engineering schemes devised to relieve the problems have created concern among the the public, the media and some government officials that sooner or later the United States will exert pressure on Canada to export Canadian waters across the boundary by means of large diversions.

The federal government, with the support of the provinces, opposes water export "on the grounds that we should first look after our own water needs; that water once exported is lost forever; that by exporting water, we promote economic development in the United States that could otherwise take place in Canada and, that there is considerable scope for much more effective management of the United States' own substantial water resources."[25] The policy is not backed by legislation nor by economic feasibility or legal-political investigations.

Many of these objections to export are shared by the states between the Canadian border and the proposed export regions. In the Great Lakes states, for instance, the lakes are seen as a key element in a marketing strategy for promoting economic development.[26]

At the present time there are no active proposals by government for major export of water. There have been no economic studies of major interbasin transfer schemes. The studies that have been conducted point to the economic impracticality of applying engineering solutions on such a large scale. Economic studies show that the cost of water diverted from the Missouri and Arkansas rivers - not from even the Mississippi itself, which would be the route for Great Lakes water - to the High Plains would greatly exceed its value for use in irrigation. One study found the maximum ability to pay for imported water (a higher figure than a farmer's willingness to pay) would be around $120 per acre-foot. The United States Army Corps of Engineers calculated that the cost of importing water would be $320 to $880 per acre-foot at projected energy prices and excluding the considerable addition

costs of distribution.[27] The United States has a history of distributional politics that support uneconomic water projects in the west. However, as Kneese points out it seems doubtful that a big enough legislative 'Christmas tree' could be put together to support major importation of water to the High Plains.[28]

Talk of such diversions has raised political objections within the Great Lakes region. In February 1985 the governors and representives from the eight Great Lakes states and Quebec signed The Great Lakes Charter. Ontario was also expected to sign the "good faith agreement". The charter has no force of law, but it pledges the states and provinces to make efforts to protect against excessive water consumption and diversions of water from the Great Lakes. It requires the signers to consult with each other before allowing a diversion, to share information on water use, and to develop regional water use plans. Governor Blanchard of Michigan called the charter "a signal to the Sun Belt that we stand together internationally to protect our water resources".[29]

However, the states' authority to veto water exports on their own remains in doubt and for fear that the United States Supreme Court would disallow a unilateral water embargo the charter does not specifically forbid diversions. In two recent court cases, Sporhase vs. Nebraska and El Paso vs. Reynolds, certain prohibitions on water exports were ruled illegal on the grounds that they interfered with interstate commerce. The Sporhase decision also raises uncertainty about the fate of interstate compacts that include provisions to restrict diversion of water supplies.

There are currently legislative proposals before the United States Congress designed to block major diversions. One piece of legislation, proposed by Illinois Democrat William Lipinsk and Illinois Senator Charles Percy (H.R. 4366) introduced in 1983, prohibits the transfer of water outside

the Great Lakes states without the approval of all Great Lakes states and the IJC. The legislation also prohibits any federal study of the feasibility of diversions.

One might note that this is a type of issue that tends to produce much political smoke from the smallest spark of activity. By reacting to highly speculative and improbable schemes politicians can attract attention and appear resolute, without actually having to confront anyone or make any damaging political tradeoffs.

This is not to say that the federal government should not have policies for the issue. For its own satisfaction it might want to determine whether there are any circumstances in which it would be beneficial to Canada to promote or participate in major water export schemes. Moreover, the government must be able to respond when the issue is raised, as it will be periodically. But until there is a concrete proposal supported by the American government it is an issue not worthy of much attention.

There are subtler forms of diversion or water export. The disproportionate water consumption of shared waters is a form of diversion out of the system for which Canada receives no compensation and suffers some economic loss. (See discussion on consumption below). Some people argue the export of hydroelectricity is a form of water export for it commits Canada to a pattern of generation, and thus water regulation, to satisfy American not Canadian interests.

Water Export by Tanker

A related issue is export of water by ship tanker to the United States or other markets further afield. The issue is more applicable to the lower St. Lawrence and east and west coasts than the Great Lakes. But as the issue

has been discussed before the Inquiry on a number of occasions and it is of an international nature a brief discussion of the issue is presented here.

Water may be exported in dedicated water carriers or, as some entrepreneurs are promoting, in oil tankers on the backhaul leg of an oil delivery voyage.[30] Recently New York State sued Exxon for loading water without state approval directly from the Hudson River to both types of tankers for delivery to its oil refinery and the civil water system on the island of Aruba. The case was settled out of court. New York State is preparing legislation to cover such types of withdrawals and exports from state waters, including the international portion of the St. Lawrence River and Lake Ontario. State officials have expressed interest in coordinating policies for such exports with Canadian governments.

On the West Coast one promoter has plans to export water in dedicated tankers from Freil Falls on the British Columbia coast. Final approval for a water licence from the provincial government depends on the promoter securing a market for the water. Tentative interest has been shown regarding export of water from other locations on the East Coast and the St. Lawrence. Prior to Exxon's legal entanglements with New York State its representatives had exploratory discussions with federal and Quebec government officials regarding the possibility of drawing water from the St. Lawrence or the Saguenay to supply its refinery on Aruba.

The federal government has no specific policies, legislation or body of common or statute law to deal with such exports. Should the government's opposition to export by diversion be applied to export by tanker? Tanker export differs in significant ways.

1. In tanker export water is drawn from near the ocean either directly from rivers or from existing or specially created reservoirs. There are no

downstream users denied water and as the water is about to enter the ocean it is surplus to human use, though it may have ecological or environmental significance in the estuary.

2. Tankers can only load discrete amounts of water at one time. The amount of water is insignificant compared to inter-basin exports.

3. Inter-basin transfers create dependency relationships between the exporting and importing regions that may have disturbing political implications, particularly when the water short region is in a country as big and powerful as the United States. Water export by tanker does not create the same type of dependency relationship for an importer can easily arrange deliveries from alternative sources of supply.

The British Columbia government, in responding to tanker export schemes, suggested approval if the schemes meet provincial guidelines. These are: exports from remote coastal streams, the water to be in excess of any conceivable future demand, the water licence not to acquire priority relative to existing or future provincial requirements, and periodic renewal of the licence. Among the prerequisites the applicant would have to satisfy the Comptroller of Water Rights of the technical and economic feasibility of the project and the environmental impact; he would also have to submit research reports of potential markets and evidence of negotiated conditional agreements with potential customers.[31]

If an exporter complies with existing federal legislation - with regard to navigation, harbours, shipping and fisheries - the government lacks other legislation to prohibit, tax or regulate the trade itself. The trade may never develop. Canada does not have a high enough volume oil trade with potential markets in North Africa or the Persian Gulf to make feasible the backhaul trade. As for the trade in dedicated carriers, transport costs are

the critical factor for such a low value by volume commodity. The distance of Canadian sources from possible markets puts Canada at a disadvantage in relation to more favourably located competing suppliers.[32] Nevertheless the government may need the legislative arrangements in place to respond to promoters and, if their plans are feasible, to ensure appropriate navigation safety, environmental safeguards, and an adequate return to Canada for the sale of water.

CONSUMPTIVE USES

According to projections made by the IJC's International Great Lakes Diversions and Consumptive Uses Study Board, in its 1981 report, within the next 50 years consumptive uses of water in the Great Lakes basin will become much more significant than present diversions into and out of the basin. Consumption of Great Lakes water could increase from the 1975 rate of 140 cms (4,900 cfs) to a range between 450 cms (16,000 cfs) and 1,050 cms (37,000 cfs) by the year 2035. The board estimated the most likely rate would be 720 cms (25,400 cfs). Such levels of consumption would lower the levels of Lakes Michigan, Huron and Erie in the range 12 to 34 centimetres, and decrease the flow from the outlet of Lake Ontario by 8.6 per cent.[33]

The projections have been criticized for being too high. The largest projected consumptive use comes from the energy sector, condensation cooling in nuclear and conventional thermal power production. More recent estimates would take into account the gains made in energy conservation and revised thinking about the proportion of future energy supply from nuclear power. Industrial projections would also have to be re-examined in light of conservation measures and new water conservation technologies. The IJC itself is now questioning the feasibility of projecting water consumption as far ahead as 2035.[34]

In general, falling lake levels, as the consequence of consumption (and diversions), will benefit shoreline owners and beach users slightly who suffer from flooding and erosion damage during periods of high lake levels. (One scenario sees a $6 million benefit per year to coastal zone interests for the next 40 years). The falling levels will reduce the draught available to lake carriers and reduce the amount of tonnage they can carry. The cost to shipping would likely be greater than the $13.8 million losses projected under the Diversions and Consumptive Uses Study Board maximum-effect diversion scenario.

The greatest impact would be on power generation. Under the most likely projection in 40 years the annual losses would be about $145 million and $205 million by the year 2035 (assuming a loss of 720 cms or 25,400 cfs). About 25 per cent of the losses would be on the St. Lawrence, the rest on Niagara.[35] It is interesting to note that much of the falling levels will be attributable to significant condensation cooling in thermal power plants. The power sector gains on the thermal side, but loses on the hydro side.

The major shoreline interests to benefit are in the United States. On the other hand the major navigation interests to lose are also in the United States. Canada generates more hydroelectricity than the United States and will lose most. In terms of these three uses lower levels and flows will result in net economic losses. This takes no account of the substantial economic benefits accruing to the water consumers.

From the Canadian point of view the problem concerns winning recognition of equal and similar rights in the use of boundary waters as defined under Article VIII of the Boundary Waters Treaty. The projections foresee the United States responsible for 82 per cent of the water consumption in the basin. Americans gain the economic benefit from the consumption of the water, but do not share proportionately the costs. While the United States is responsible for 82 per cent of the decrease in flow its power production does

not decline by the amount of water it consumes. It shares with Canada, in proportion to present flow apportionment arrangements, the decline in hydroelectric generation. The greater American consumption represents in effect a diversion out of the lakes for which Canada gains no compensation.

The American argument, on the other hand, is that Canada has similar rights to the water. Canada may not be exercising that right to the same degree as the United States, but that is not the concern of the United States.

If it is decided to introduce conservation measures to slow consumption, should both countries make an equal effort or should the United States make a greater effort to bring its total consumption rates more in balance with Canadian rates? Or, more importantly, should Canada press for recognition of its equal share of the water? Canada has advocated these arguments in similar issues, such as pollution abatement, but with limited success.

CLIMATIC CHANGE

The projections made about consumptive uses assumed the climate would remain constant. Recent research and climatic modeling suggest that the climate is warming. If these findings prove correct the problems associated with consumption and diversions will be greatly aggravated.

One model finds that if CO_2 doubles winter temperatures in the Great Lakes region would rise on average 3° to 4°C and summer temperatures 3°C. Precipitation may increase somewhat, but not enough to compensate for increased evapotranspiration from crops and much greater evaporation from the lakes. The outflow from the lakes might decrease about 21 per cent of the present average value (based on 3°C average increase in monthly mean temperature and a 6.5 per cent increase in precipitation).[36]

The impacts on water use and economic activity would be significant.

1. The economic impact on navigation, shoreline, and hydro power interests would be large. Hydro power losses on the Niagara and St. Lawrence could amount to an additional $750 million annually above the possible $205 million loss annually from projected consumptive uses.

2. Irrigation water demand would be much greater than under the IJC boards projections. The crop growing potential will increase with the higher temperature and longer growing season, but agriculture will require more irrigation, since the precipitation will not increase greatly.

3. Energy demands will likely decrease in winter from the warmer winter climate and increase in summer with increased air conditioning.

4. Droughts on the Great Plains are expected to become longer and more severe. This will increase pressure for large-scale diversions from the Great Lakes.[37]

LAKE ERIE

Regulation. Lake Erie has no control works to regulate the flows from the lake. The IJC, in a 1976 report on further regulation of the lakes, found that regulation of all lakes was not economically feasible, but recommended among other things further study of possible limited regulation of Lake Erie. In the early 1970s all the Great Lakes had record high water levels and the high levels combined with high wind resulted in extensive flood and erosion damage to shoreline properties. The IJC was given another reference in 1977 to determine whether limited regulation of Lake Erie would be in the public interest of both countries, that is whether limited regulation could mitigate high water damage without too much cost to commercial navigation,

recreational boating and hydroelectric power interests. The IJC concluded that limited regulation would not be worthwhile since costs greatly outweighed the benefits. It recommended better coastal zone management practices and an information program to bring about better understanding of the natural phenomena causing the fluctuations in Great Lakes levels.[38] The shift away from lake level regulation to coastal zone management makes the issue more a domestic issue than an international one.

Ice Boom. Each winter since 1965 the hydro power utilities have installed an ice boom at the head of Niagara River. The boom accelerates the formation of a natural ice arch to create a smooth ice surface. This protects shoreline and is necessary to prevent drifting ice, jams, and hanging dams that reduce flows, damage turbines and reduce power generation. Some residents in the Buffalo area claim the ice boom causes longer and more severe winters in the area. Erie County initiated court action against the boom.

The United States National Academy of Science (NAS) conducted a study for the IJC. The NAS found that the effects from the boom would be localized and small. No significant impact could be identified. The academy recommended that the use of the boom be continued, though with slight change in operating procedures. The county in 1983 withdrew its legal complaint.

NIAGARA RIVER POWER

The plans of the New York Power Authority to expand its hydroelectric power installation at Niagara raises a number of potential issues.

1. The site of the proposed installation is an old chemical plant, owned by the Stauffer Chemical Company, which produced and handled organochlorine compounds such as carbon tetrachloride and metal chlorides. Field investigations have identified high levels of chemicals at the proposed

expansion site and there is some concern that during construction buried chemicals may find their way into the Niagara River. The power authority has conducted studies and suggested remedial measures to reduce the risk of contamination to levels it believes consistent with the Great Lakes Water Quality Agreement (Annex 10), recommendations of the bilateral Niagara River Toxics Committee, and American legislation.

2. The proposed plant will divert Niagara River water further downstream than at present and bypass the reach of the river immediately downstream of the falls, which includes the Maid of the Mist Pool. The occurrences of low water levels in the Maid of the Mist Pool and the downstream rapids may be more frequent. In addition, the plant will be used for peaking purposes and this may create increased surges and fluctuations in water levels and flows in the lower Niagara to the detriment of Canadian riparian interests. The New York Power Authority contends that the alterations in existing flows will have negligible effects on downstream riparians.

3. Of more significance are the potential changes in Canadian rights to Niagara River water. The New York Power Authority utilizes the American allotment under the Niagara Treaty in one facility, the Robert Moses Niagara Power Plant. Canadian generation along the river is produced by five plants owned by Ontario Hydro, with the exception of the American owned Canadian Niagara Power Company plant. The Ontario Power and Canadian Niagara plants have lower head plants than the American facility or the Adam Beck plants on the Canadian side. Under a Memorandum of Understanding worked out in 1965 between Ontario Hydro and the New York Power Authority -- which neither federal government has authorized -- Ontario Hydro has regularly taken advantage of the higher head and capacity on the American side to "rent" higher head at the Robert Moses plant. The utility diverts water from the Canadian entitlement going to the low head plants to the American plant. In return Ontario Hydro receives electrical energy equal to what could have been

produced if the water was used at its lower head plants, plus half the increase in production resulting from using NYPA's facilities. The NYPA benefits by retaining the other half of the increased production.

Some of the Canadian plants are aging and will need replacement by the time the Niagara Treaty expires in 2000. The existing American facilities are capable of using all of the American entitlement and more under average flow conditions. As mentioned above the NYPA is planning to construct two new 150,000 kilowatt units, followed later by a third unit of the same size, to permit greater efficiency in the use of flows for peak power generation. With construction of the first two units NYPA would have an extra 300,000 kilowatt capacity for use outside peak hours. The existing and planned American facilities could probably make use of the water now diverted from Canadian facilities full time.

While the present arrangements are obviously beneficial in the short term to both Ontario Hydro and NYPA, one can question whether the relative inefficiency of the low head plants and the "renting" of head capacity on a more or less permanent basis is resulting in a de facto export of water and power. If new Canadian facilities, such as a proposed Adam Beck 3 plant, could use the water as efficiently as the American one, Canada would capture the full potential from its share of Niagara water instead of allowing New York a share of it. The problem is that Ontario Hydro has little incentive to change the rental arrangements. It has excess generating capacity province-wide and is no doubt reluctant to construct new generating facilities at Niagara to replace old but still operable plants.

The greater fear is that if Canada retires its old plants and reduces its generating capacity Canada may lose its full entitlement to Niagara flows. Interpretation of the Niagara Treaty on the loss of entitlement is open to question. Canada would argue that once a country has developed the capacity

to use the flow it does not lose its entitlement even if the capacity declines. On the other hand, the Americans would argue that equal division is in effect only for so long as both parties have facilities to use their full share. If Canadian capacity declines the United States would be free to make use of the extra flow without having to compensate Canadian interests as it does now under the rental arrangements.

The 1950 Niagara Treaty is in force until the year 2000 at which point either side may seek to renegotiate it. Already the United States Army Corps of Engineers is suggesting changes. The corps would like to decrease from 100,000 cfs to 50,000 or 60,000 cfs the flow allocated under the treaty to protect the scenic attractions of Niagara Falls during the day time in the tourist season. While in principle the increase in flows available for power production would be divided equally, the benefits would be more heavily weighted towards the United States. This is because of the low head generating facilities in Canada, possible reductions in generating capacity, and the fact that Canada has more at stake in preserving the scenic quality of the falls since it has the better panoramic view of the American and Horseshoe Falls.

Thought needs to be given now to the coming end of the Niagara Treaty to safeguard the Canadian entitlement. Canada may need to consider strategies for negotiating a clearer principle on entitlement. The federal government will also need to develop with Ontario and Ontario Hydro plans for maintaining, upgrading or constructing the generating capacity on the Canadian side to ensure that Canada can make use of its full share of the flow. The renegotiation of the treaty will also open the door for reconsideration of other upstream diversion and consumptive use issues -- such as increasing Canadian entitlement to compensate for losses due to the Chicago and New York State Barge Canal diversions and greater American consumptive use of Great Lakes water.

ST. MARYS RIVER

Fisheries and Hydro Power. The IJC's International Lake Superior Board of Control oversees the implementation of the commission's orders concerning regulation of the flow in the St. Marys River. The commission requires certain minimum flows in the rapids to provide for fish habitat. The flow on average is about 168 cms (6,000 cfs). The allocation reduces the water available for hydro power generation and the power companies on both sides of the border are seeking increases in the flow. The issue sets transnational power interests against transnational fisheries interests. Ontario and federal agencies with the encouragement of the IJC are looking at what remedial measures can be undertaken in the hopes of achieving a solution that improves the fisheries habitat in the St. Marys Rapids and increases the flow available for hydroelectric power production.

Hydro Power and Surplus Flows. The flow of the St. Marys River is apportioned equally between Canada and the United States for hydroelectric generation. The Canadian power facilities have long lacked the generating capacity to make full use of its entitlement. However, in 1982 a new Great Lakes Power Company plant began operation and now Canada has the capacity to use its allotment. For more than 60 years the American plants, a United States Government owned plant and the Edison Sault Power Corporation plant, were able to capture some of the Canadian unused portion. But now, without the excess from the unused Canadian allotment, the private plant operates at about 80 per cent capacity.

The American company wants to be able to use its surplus capacity in times of high outflows from Lake Superior. However, since the waters of the river are apportioned equally, it is argued by Canadian interests that the excess water should not be freely available to American power interests. The Americans feel that water surplus to the needs of either side should be

available for use by the country that can make use of it. The two federal governments can not agree whether this practice should continue, and under what conditions. The matter remains unresolved and has been raised within the IJC. Canadian reluctance to allow American use of surplus flows is strengthened by the American position of refusing credit to Canada for the Long Lac-Ogoki flows.

WINTER NAVIGATION

The Great Lakes and St. Lawrence Seaway are generally closed to shipping from freeze up in mid-December to breakup in early April. Shipping, iron ore and grain interests, especially in the upper lakes, see benefit from keeping the seaway and lakes open to shipping throughout the year. Their view was supported in 1979 by the findings of a United States Army Corps of Engineers demonstration project and study on winter navigation. The corps concluded there would be a net economic benefit from extension of the shipping season. The report recommended year round navigation in the four upper lakes and a ten month season for the Welland Canal, Lake Ontario, and the St. Lawrence Seaway. The Water Resources Authorization Bill H.R. 3678 included provisions in line with the Army Corps of Engineers recommendations.

The winter navigation proposal and Corps report have been challenged on both sides of the lakes. Even if navigation routes could reliably be kept open under extreme winter conditions, the Canadian government sees no economic advantage to shifting established winter transportation arrangements from existing road, rail and port facilities too costly to maintain lake transport. The federal government is also concerned about the lack of an environmental assessment for winter navigation. The IJC in 1979 inquired of the governments regarding the potential effects. The commission advised them that winter navigation may require an application (as it affects levels and flows). The commission also noted that winter

navigation might have serious implications for the Great Lakes Water Quality Agreement and that it should not be considered in the absence of an extensive environmental impact assessment.

Canada sees problems with ice management and balancing existing riparian interests. Winter navigation will create broken and choppy ice conditions which may lead to ice jams and "hanging dams" that hamper lake level regulation and hydro power generation. Winter navigation will also increase the risk of oil spills.

In the United States several environmental groups and Great Lakes states share Canadian opposition. New York State, for example, has an interest in seeing New York City retain its role as a winter port for midwestern states. Since the Army Corp's report shipping has declined, in particular iron ore shipments, and this undermines the assumptions behind the corp's finding of a positive economic benefit from winter navigation.[39]

The provisions for winter navigation in H.R. 3678 were dropped in face of strong opposition from some Great Lakes governors. The winter navigation provision was replaced by an amendment to establish a Great Lakes Commodities Marketing Board to improve and promote shipping on the Lakes. The issue is now dormant but it may re-emerge as shipping prospects improve. The opposition in the United States will likely again challenge the proposal. It promises to remain on the bilateral agenda, most of the time dormant, but periodically becoming active and requiring diplomatic attention.

2.2. GREAT LAKES WATER QUALITY

One of the first tasks assigned to the IJC in its first year of operation in 1912 was to determine the extent, causes and localities in which boundary waters from the Rainy River to the St. John's River were polluted to the point of being "injurious to the public health and unfit for domestic or other uses" (docket 4). The major problem was the discharge of raw sewage, contaminating drinking water supplies and causing periodic outbreaks of typhoid and other epidemics. The commission conducted an essentially bacteriological investigation and found in its 1918 report the connecting channels of the Great Lakes were "unsightly, malodorous and absolutely unfit for domestic purposes" and the situation along the frontier "generally chaotic, everywhere perilous, and in some cases disgraceful."40 The newly developed practice of chlorinating water supplies relieved the two governments of the necessity of considering sweeping police powers for the IJC to regulate and prohibit this pollution and adopting the costly sewage treatment approach as recommended by the commission. Typhoid outbreaks declined, but discharge of pollutants continued.

After the second world war the commission looked again at pollution in the Great Lakes connecting channels. The commission in its 1951 report found bacteriological contamination from urban sources was three or four times greater than in 1912. Industrial discharges were also now a major problem.

On the recommendation of the IJC the two governments adopted common water quality objectives (the first international water quality objectives of their kind) and set up bilateral monitoring boards. There was progress in the limitation of gross pollutants such as phenols, cyanides, oil and suspended solids; however, municipal and industrial treatment did not keep pace with population growth and industrial expansion. The political commitment was lacking to control pollution and restore water quality.

In 1964 the IJC once more investigated Great Lakes water quality. The reference asked the commission to determine the extent of the pollution problems in the lower lakes, the causes and sources of pollution, and to suggest practicable remedial measures. The time was more propitious for government attention. Growing evidence from water quality studies pointed to problems beyond the connecting channels. The quality of the lower lakes was deteriorating; in particular, studies highlighted nutrient enrichment in Lake Erie. During the 1960s the environmental issues were rising on the political agenda. To the new environmental movement the condition of Lake Erie, thought to be 'dying,' became synonymous with negligent government stewardship of resources and the environment.

Three IJC interim reports and the report of the two Technical Advisory Boards in 1969 confirmed fears about pollution of the lower lakes and found phosphates the principal cause of Lake Erie's eutrophication. The reports showed that the United States contributed much more to pollution than Canada. They also identified other pollution problems - oil discharges, vessel wastes, dredging materials, radioactive wastes, thermal discharges, persistent toxic chemicals, and continuing bacteriological contamination. The reports recommended phosphate control, water quality objectives and programs to meet them, and international coordination of the programs, monitoring and surveillance.

Even before submission of the IJC's final report in 1970 the Canadian government approached the American government regarding joint action. The Americans were reluctant to go as far and as fast as Canada would have liked. First, American negotiators would not accept the Canadian interpretation of the Boundary Waters Treaty as giving each country equal rights to the assimilative capacity of the lakes. Canadian negotiators dropped the demands. Second, the two sides differed on schedules for reducing phosphate inputs. Canadians favoured limiting phosphate concentrations in detergents,

the Americans on removal through sewage treatment. The final agreed reductions fell short of the 1970 IJC recommendations. Third, the Americans would only agree to a schedule for municipal treatment plants that allowed them to be "complete or in the process of implementation" by December 31, 1975. In Ontario more than half of its Great Lakes population was connected to adequate sewage treatment plants while in the Great Lakes only a few areas had adequate facilities. Fourth, the Americans were reluctant to establish an IJC office to oversee the agreement.

On the Canadian side, the federal government faced difficult negotiations with Ontario. In return for Ontario participation in the agreement the federal government agreed to provide an accelerated $173 million program of CMHC loans and grants for municipal sewage treatment facilities.

In April 1972 President Nixon and Prime Minister Trudeau signed the agreement in Ottawa.

THE 1972 WATER QUALITY AGREEMENT

The agreement has three major themes:

1. General and specific water quality objectives for the Great Lakes and international section of the St. Lawrence,
2. Specification of remedial programs to improve water quality and achieve the objectives,
3. Increase in the responsibilities and authority of the IJC to monitor the progress under the water quality agreement and assist in its implementation.

The agreement was a first step to address the problems of Great Lakes pollution. It recognized the diverse forms and sources of pollution that threatened the lakes. In this regard it set out general and specific water quality objectives. But the substance of the agreement concerned the most

immediate and apparent problem - eutrophication problems arising from inadequate municipal sewage treatment. While the problems with industrial pollutants, toxic substances, and radioactivity were recognized they were not emphasized.

The approach required assembling and verifying data, coordinating research, and monitoring the progress of agreed upon programs. The IJC was given these tasks. To assist in this work the Water Quality Board and Research Advisory Board were created under the agreement. These boards and others created by the IJC were staffed by members of federal, provincial and state governments. Also a few non-governmental experts have been appointed to the Research Advisory Board. The agreement established a regional office for the IJC in Windsor to assist the boards in their work and help the commission in the technical analysis of the board's work.

The boards and the commission were to prepare annual reports for use in the ongoing planning and evaluation. The governments collected the data. The IJC was responsible for verifying it, evaluating the nature of the water quality problems, establishing the need for new or revised programs, and drawing public attention to the agreement.

The agreement also called for two new references. The Upper Great Lakes Reference was to identify water quality problems within the Upper Great Lakes (Superior and Huron), and recommend a program to prevent further deterioration. The Pollution from Land Use Reference was to identify the nature and magnitude of pollution resulting from land based activities including agriculture, forestry, urban, and other non-point sources.

The approach under the agreement was open ended. As clean-up programs to deal with the most immediate problems moved into gear and as information on

Great Lakes water quality improved the approach could be refined and new programs initiated.

The agreement it should be noted is not a treaty. An agreement has no force in domestic law, unlike a treaty in the United States. It is an important declaration of intention and obligation, but it is not binding and domestic dischargers cannot be prosecuted for violating any of its provisions.

Implementation

In Ontario municipal sewage treatment plant construction had a 20 year head start on American treatment programs. Toronto for example had treatment facilities decades ahead of large American Great Lakes cities. The American program was slow to start. In October 1972 the United States Federal Water Pollution Control Act (PL 92-500) was enacted and the legislation required development of complex new regulations for treatment plants. In addition President Nixon impounded all funds for sewage treatment plant construction under the Act, which may have had little practical effect except to anger the Canadian government. Canada protested against the "slippage" in meeting the December 31, 1975 deadline that required sewage treatment plants to be "in the process of implementation."

The Regional Office of the IJC came under fire. It was set up with little institutional direction. As it grew it seemed that it might serve as a parallel and independent information gathering and evaluation body to the IJC boards. The Water Quality Board and the American government, in particular, were displeased with the possibility of the IJC obtaining and evaluating information independent of government input, participation and scrutiny. The commissioners were unwilling to restrict the Windsor Office's role and until the 1978 agreement its role remained ambiguous.

The IJC and boards monitored the progress and began to identify specific geographic problem areas. It found in 1975 that progress had been "generally slow, uneven and in certain cases, disappointing." Phosphorus reductions were not being met. Also, of growing concern were the problems of industrial discharges and toxic wastes.

The 1972 agreement called for a five year review. In the review and subsequent renegotiation of the agreement the tables turned. In 1972 Canada advanced the more sweeping proposals. The United States responded with caution and conservatism. After 1972 the United States was slow to launch its municipal treatment program, mainly because of the teething problems associated with the introduction of the Clean Water Act. Nonetheless, the new regulatory legislation, based on effluent standards, was more far reaching than any Canadian industrial pollution legislation. While the United States might have been lagging in municipal treatment construction it now had in place a far more stringent approach (in law at least) to industrial pollution control than Canada.

The review focused on three issues. First, to address the new emphasis on industrial pollution American negotiators wanted acceptance of the effluent standards approach of the Clean Water Act. Canadian negotiators dismissed the idea that American law should apply extra-territorially. On the equity principle Canadians reacted to the implication that Canada should have to make an equal commitment to industrial pollution abatement when it was much less responsible for the problems than the United States. At a practical political level, even if federal negotiators accepted the approach they would have to convince the Ontario government, which had shown little inclination to introduce stringent industrial pollution control measures.

Second, the Americans argued for basin-wide water quality standards while Canadians favoured boundary water standards as established in the 1972

agreement. The Canadian side did not feel the agreement should deal with tributaries, which were entirely domestic. The existing approach was felt to be more appropriate.

Third, the American government wanted to 'disestablish' the Windsor Office of the IJC, fearing the role it might carve out for itself and the commission in bilateral relations. The Canadians shared some of the American misgivings about infringements on the sovereign authority, but preferred to see the office reformed rather than abolished.

THE 1978 WATER QUALITY AGREEMENT

The 1978 agreement builds on the 1972 agreement. The agreement recognizes that, while the American municipal treatment program may be tardy, improvements were made. By 1979 treatment facilities to treat phosphorous were adequate for 84 per cent of the sewered population in the United States and 99 per cent in Canada, compared to 5 per cent and 80 per cent respectively in 1971.[41]

The agreement focuses on specific water quality objectives and in particular toxic wastes. The emphasis on toxics was strenthened by new detection capabilities that could identify toxics in concentrations as low as parts per billion. The agreement sets objectives for about 30 chemicals that are harmful to the biota, or accumulate in the food chain or sediments. The other significant features of the agreement include:

1. The governments commit themselves to 'virtually eliminate' the discharge of persistent toxic substances in line with a philosophy of 'zero discharge' (Annex 12), to ban the discharge of toxic substances in toxic amounts, to establish an early warning system to anticipate and prevent future problems associated with toxics.

2. The municipal and industrial pollution abatement programs are to be completed by the end of 1982 and 1983 respectively. The deadline for the municipal plants was targeted to the expected completion date of the Detroit sewage treatment plant.

3. The IJC continues its reporting functions regarding the condition of the lakes. In addition it provides advice and makes recommendations to the governments about other aspects of the agreement, provides assistance in coordinating joint activities under the agreement and investigates other Great Lakes water quality problems at the request of the governments.

The Water Quality Board and the Science Advisory Board (formerly the Research Advisory Board) assist the commission.

4. The Windsor regional office remains, but its duties are now defined as providing administrative support and technical assistance to the two Boards, and a public information service for the programs, including public hearings, undertaken by the IJC. Thus it is responsible to the boards for its support and assistance work and to the commission in its public information service.

5. The general objectives of the agreement apply to the entire Great Lakes system, not just boundary waters

6. More stringent overall phosphorus loading reductions for each of the lakes was established, the apportionment of the loadings to be determined by subsequent negotiation.

Implementation

The 1982 First Biennal Report under the Great Lakes Water Quality Agreement found in general the upper lakes to enjoy relatively good water quality.[42] Lakes Erie and Ontario, however, continue to suffer considerable environmental degradation by sediments, nutrient enrichment, and toxic and hazardous substances. Good progress has been made in arresting eutrophication in the lakes, though the lakes still do not meet the standards set by the agreement. Toxic and hazardous substances are a more serious problem. There has been less progress due to the large number of chemicals entering the lakes from different sources and the complexity of the problem. Much more effort was required to meet the 1978 goals regarding such substances. The commission also identified a number of "areas of concern" 24 of which had been identified in every report of the Water Quality Board since 1974.

Under the agreement the governments committed themselves to a number of years of energetic activity to implement agreed upon programs by the stated deadlines. But in practice the energy seems to have failed. The governments were supposed to have made "every effort" to implement by 1980 programs relating to elimination of toxic identification and abatement. In 1982 the IJC reported "no substantial progress" and "little evidence" of any effort. By the end of 1982 and the end of 1983 the municipal and industrial abatement programs were to be in place. The commission found progress in several components but the rate of progress "disappointing" and little sign of effective enforcement programs especially for industry. By May 1980 the new phosphorus loadings were to be negotiated. A supplement to the phosphorus annex was concluded in October 1983. The parties were to define by the beginning of 1980 "limited use zones" for the outlet areas of major industrial and municipal discharges. None had been designated by mid-1982. The IJC report noted the debate in the United States on whether such zones

were legal under the Clean Water Act, and Canadian reluctance to define zones in the absence of similar action on the part of the United States.[43]

Toxics

The toxic approach is a tentative first step in addressing the problem. There are perhaps 50,000 chemicals used in commerce and industry that find their way into Great Lakes waters. About 2,000 of these substances have properties that may adversely affect the biota or accumulate, yet less than 200 of them have been studied with sufficient depth to permit the specification of permissible standards for water or biota. The IJC's First Biennial Report points out the dilemma of dealing with the chemical assault on the lakes. We do not always know about the potential 'hazard' of a substance. Do we attempt to control as many as possible of these substances now, knowing that many will prove harmless, or do we only control the chemicals we now know to be toxic?[44]

The agreement adopts a philosophy for the control of inputs of persistent toxic substances of "zero discharge" (Annex 12), yet it sets out water quality objectives for many such toxic substances (Annex 1). As discussed below, the American members of The Niagara River Toxics Committee found the conflicting annexes offered no useful guidance. They refused to endorse the Canadian resolution that the parties to the agreement "revise and make progressively more stringent the objectives as currently established, in order to more closely follow the zero discharge philosophy of Annex 12."[45]

The IJC Biennial Report also argues for a re-examination of the philosophy behind the objectives. They are essentially "simplistic chemical and physical measures as opposed to life and health-oriented indicators."[46] They do not account for the complexities of water use patterns, possible synergistic or antagonistic effects of mixtures of chemicals. Nor do they reflect broader

social goals and concerns within the basin. For example, the water supply from the Niagara River to the town of Niagara-on-the-Lake generally meets the objectives of the 1978 Agreement, but the town remains unconvinced and has changed its water supply away from the river. The commission would like to have greater public participation in the setting of objectives.

The thrust of IJC criticism is the failure to date to bring effectively to life the 'ecosystem approach'. The control of toxics through objectives is "simplistic" and should give way to "ecosystem objectives", objectives that take account of the cumulative effect from multiple sources over time. Surveillance and monitoring is adequate for assessing compliance, but does not give sufficient attention to detecting emerging problems nor in interpreting and reviewing the vast amount of data generated. Much research, particularly American, is directed at supporting the needs of regulatory programs, but not at broader research questions about how the Great Lakes respond to the pollution they receive. The Great Lakes lack a comprehensive management strategy. The situation is one of divided jurisdictions, occasionally contradictory legislation, fragmentation of purpose, direction and resources, and an institutional failure to respond to the complexity of the Great Lakes system.

NIAGARA RIVER TOXIC POLLUTION

Canada faces one of the most difficult and frustrating transboundary pollution issues in the toxic pollution of the Niagara River. The federal and provincial governments conducted a baseline study in 1980, updated in 1981. The studies found that concentrations of organics and metals exceeded the 1978 Great Lakes Water Quality Agreement objectives in less than 10 per cent of the samples and most organics in Niagara River water were below the analytical detection limit. However, analyses of suspended sediment, bottom sediment and fish indicated the presence of numerous organic compounds. All sediment

samples from the lower Niagara River and the majority of samples from the Buffalo River Tonawanda Channel had concentrations of polychlorinated biphenyls (PCBs) exceeding the Ontario Ministry of the Environment (MOE) criterion for confined disposal of dredged spoils - 50 ppb. Less than 1 per cent of the loadings could be accounted for from Canadian sources. Many of the compounds detected in the lower river are not detectable in Lake Erie indicating continuing intermittent inputs of these compounds to the river itself. The river is the source of dioxin and mirex entering Lake Ontario. These compounds have been found to contaminate herring gull colonies and are responsible for the ban on commercial fishing.[47]

In January 1981 the IJC released a special report on Niagara River pollution. The report called for a comprehensive and coordinated study of the total Niagara River system to identify the problems and appropriate remedial measures.[48]

On the American side 12 municipal wastewater treatment plants and 89 industrial facilities licensed by New York State discharged effluent into the river or immediate tributaries. Fifteen major industrial sites in the area account for about 95 per cent of direct industrial discharges of priority pollutants (as defined by Sec. 307 of the United States Clean Water Act). In a total flow of 460 mgd, the 15 sources discharge daily maximum loads of 558 lbs of organic priority pollutants, 237 lbs of total phenols, and 682 lbs of heavy metals. Four municipal plants discharge about 90 per cent of the industrial wastes that are treated by municipal plants. In a flow of 268 mgd, they discharge about 328 lbs of organic priority pollutants, 525 lbs of phenols, and 566 lbs of heavy metals. On the Canadian side there were 3 municipal and 12 industrial dischargers accounting for 23 lbs of organic priority pollutants, 3 lbs of phenols, and 156 lbs of heavy metal in a flow of 62 mgd.[49] The major municipal polluter is the city of Niagara Falls, New York.

In addition, there is a serious problem from chemical waste dumps of pollutants leaching into ground water, municipal and industrial drains, and then into the river. There are 215 chemical waste dumps on the American side in the Niagara region (and 12 in Ontario). At least 61 sites in New York and 5 in Ontario have significant potential for contaminant migration to the river. Litigation has been initiated for 27 sites. At least four have leaked contaminants and are focal points of controversy - Love Canal, Hyde Park, "S" Area, and 102nd Street all in Niagara Falls, New York.

Niagara Falls, New York. By far the major source of pollution comes from Niagara Falls' wastewater treatment plant. It came into operation in 1978 and was designed to treat 48 mgd of industrial, commercial and domestic wastes. No plant before had been designed to treat such a high volume of combined wastes. Within a few months the granular activated carbon filters used for the removal of organic chemicals failed. The plant has had to be completely redesigned and reconstructed. Legal, planning, and funding difficulties delayed the start of reconstruction and the plant is not scheduled for completion until March 1985. In the meantime the plant receives the wastes from 31 significant industrial users and discharges about 370 kilograms per day of priority pollutants. When the plant resumes operation it is expected to remove about 70 per cent of these pollutants.[50]

Love Canal. The situation along the river first came to national and international prominence in 1978-79 when the Love Canal area was declared a national emergency. The 16 acre dump site contains a wide variety of chlorinated organics, metals, sulfides, miscellaneous chemicals and muncipal waste. Remedial work, consisting of barriers and wells to pump the leachate and costing in the order of $300 million, has been undertaken by the EPA and New York State using funds under the "Superfund program". (Superfund is a $1.6 billion fund raised from taxes on the production and importation of petroleum and certain chemicals, supplemented by funds from general revenue. It is used

to finance removal or remedial activities to stop imminent and substantial dangers from a release or threatened release of hazardous substances).

Dioxin has been identified in the sediment of storm sewers and in surface water sediment samples at the outlet of the sewers. The fear is that the toxic chemicals are entering into local creeks from the Love Canal site.

Hyde Park. The 15 acre Hyde Park site contains chlorinated organics, phosphates, sulfides, fluorides, sludges and miscellaneous chemicals.[51] In response to leaks from the site the EPA, Justice Department and state agencies took Occidental Chemical Corporation (originally Hooker Chemical) to court. A settlement has been reached but Canadian officials contend that it was based on faulty hydrological information. Subsequent investigations confirmed that leachate from the landfill has infiltrated in some places through the unconsolidated deposits and the bedrock (Lockport dolomite). Occidental Chemical under court direction is carrying out an extensive sampling of soils and the aquifer around the site. But Environment Canada remains concerned that the investigations do not adequately address the potential deep rock migrations of chemicals to the river.

"S" Area. The 16 acre "S" Area contains organic phosphates, acid chlorides, phenol tars, liquid disulfides, monochlorotoluene, metal chlorides, thiodan, chlorobenzenes and miscellaneous chlorinated organics. "S" area has been the subject of court actions since December 1979 when EPA, Justice and New York State took Occidental Chemical (Niagara Falls) to court. In January 1984 a settlement between the parties was submitted to the court. The final court decision has not yet been made. Canadian officials believe the settlement is based on theoretical modeling and untested technologies that may not be adequate for the task.

102nd Street. Hooker Chemical (now Occidental Chemical) and the Olin Corporation used this 20 acre dump site, part of which is landfill overlying alluvial river deposits hydrologically connected to the river. Studies indicate contaminated ground water intruding into the river. Occidental has been conducting studies at the site since 1977 but no significant remedial work has been undertaken.

EPA is taking a different approach in this case. It will undertake studies, assessments and remedial work using the Superfund. At various points the industries will have the opportunity to assume responsibility for the remedial work. If the industries defer EPA will carry out the necessary work and attempt to recover its costs through litigation. Although studies were scheduled to start in 1983 they have yet to begin.

The Canadian government has been anxious and frustrated by what has been happening on the New York side of the river. Although the ambient water quality standards are being met the accumulation of toxics in sediments and accumulation in the food chain downstream are troubling. Government officials perceive a preoccupation of American governments with immediate local effects and litigation rather than concern about the connection between the dump sites and the river. Canadian officials worry that large quantities of toxic materials are entering the river. They have not been satisfied that American agencies have acted quickly enough or committed enough funding to remedy the problems. The concern is fuelled by what they feel has been a breakdown in consultation (some officals believe deliberate) and American unresponsiveness in providing the information needed to alleviate Canadian fears.

A major complicating feature of the issue is the legal actions being taken for the major dump sites which have delayed the implementation of remedial actions and stifled meaningful bilateral discussion. The court

process is designed for the United State domestic system and is largely inimical to bilateral problem solving. The court is first of all interested in who is to blame. The final concern is what should be done to solve the problem. The process is formal, rigid and lengthy. At the end of every phase the court publicizes the decisions or findings and the public is given 90 days to respond. From the company's point of view it is to its advantage to delay a final settlement and put off costly remedial work as long as possible. The court process provides ample opportunity to employ delaying tactics.

With the issue tied up in the courts Canada is effectively excluded from obtaining information needed to formulate an informed response. Much of the important information and analysis shaping the court settlement and remedial plans is only available to the litigants. Canadian officials can not for example find out what alternative technologies were considered in the formulation of the final court settlement. The information is confidential and the Canadian government must accept American assurances that the settlement represents the most effective remedial measures. The confidentiality of the court process destroys the possibility of creating a common information base -- the first step in international problem solving. It is essential to have a common information base when so much of the scientific information is uncertain.

The United States government offered Canada the opportunity to participate in the confidential aspects of the proceedings on the condition that Canadian officials swear to protect the confidentiality of the information. The government declined for it could not accept subordination to the authority of a foreign court or abandon its prerogatives to use the information to protect Canadian interests.

The American government treats the issue as a domestic problem. The government maintains that the issues are being adequately dealt with under domestic legislation and court proceedings. The American government assures Canada that the United States will live up to its international obligations. But the Canadian government can not easily accept American assurances that Canadian interests will be protected, particularly when Canadian officials do not think that enough is being done, nor that the studies being undertaken are adequate.

The Ontario government seems not to have been satisfied with federal actions. The provincial government decided to participate directly and petitioned the United States District Court to become an intervenor in the "S" Area case. Public interest groups -- Pollution Probe and Operation Clean-Niagara -- had been granted the status amicus curiae in the previous case and independently of Ontario sought to upgrade their standing to that of intervenor. The province was alone granted intervenor status in March 1984 and the environmental groups were denied the opportunity to participate more effectively in the proceedings.

One international response to the issue was the creation of the Niagara River Toxics Committee in 1981 to cooperate in joint investigation of toxic chemicals entering the river. The committee included membership from representatives of Environment Canada, Ontario Ministry of the Environment, EPA, and the New State Department of Environmental Conservation. The committee completed its study in October 1984. From the Canadian point of view the report merely restates the problem; it adds no significant information or recommended courses of action. Even though the report offers little new the committee could not agree fully on the recommendations. The American members declined to go beyond recommended monitoring programs to an international conceptual allocation plan for toxics in Lake Ontario. And they could not agree with the Canadian members to make the standards for toxics in Annex 1 of the Great Lakes Water Quality Agreement more stringent and in line with the zero discharge philosophy of Annex 12.[52]

CONCLUSIONS

This paper has presented an overview of water issues along the boundary with emphasis on the complexity of the levels, flows, and quality issues of the Great Lakes. As background for considering means of better dealing with transboundary water and environmental problems, it has shown the nature of transboundary issues in terms of some political pressures and constraints that affect their resolution.

There are no easy strategies for the federal government to improve its performance in dealing with these complex inter-jurisdictional issues. The federal government is constrained in making effective responses to current and emerging transboundary water problems. For some of the major issues, like Great Lakes water use apportionment or Niagara River clean up, American domestic and bilateral policy is non-responsive to Canadian concerns. Also, the Canadian federal jurisdictional structure gives the provinces the substantive power and authority for water resources and denies the federal government an effective implementation role.

There has since the beginning of this century been competition for boundary water resources. Present trends in consumption add a new note to Canadian efforts to preserve for Canadian use an equal share in boundary waters. If current indications of climatic warming and consequent reduction in Great Lakes waters are confirmed the competition will become even more intense.

Federal officials with a responsibility for bilateral boundary issues have only a small canvas on which to develop innovative and effective policy tp protect Canadian interests. This is not to say there is no room for rethinking of Canadian government policies, for improving Canadian strategies, or creating a role that better reflects the national interest in

water. Below are set out some general concluding observations drawn from the discussion of bilateral boundary water issues.

1. American views on boundary water issues challenge Canadian values and goals. When the American government does advance positive policies they may in effect be an extra-territorial extension of domestic policy, such as the Clean Water Act or the scenic and wild rivers policy. The initiatives propose one method of tackling environmental problems, which may be appropriate in the American context. But they disregard Canadian concerns and verge on the presumptuous in assuming away the sovereign prerogatives of Canadian governments to manage and protect the environment in Canada as they think appropriate.

In other areas the Canadian government faces a struggle receiving a serious political hearing in the United States for some of its positions, such as credit at the Sault and Niagara for water diverted into the basin and compensation for water diverted either directly or through consumption from the Great Lakes. For these issues the United States has little incentive to consider Canadian views for it would lead to a whittling away of the advantages it already enjoys.

2. Traditionally bilateral issues are treated separately with no linkage, except the precedents. Such an approach may be too restrictive. The basis for successful settlement of issues is a reciprocal interest and for many types of issue one side loses to the benefit of the other. More imaginative thought might be given to packaging issues to create possible outcomes in which both sides benefit. Canadian concerns at the Sault and Niagara might be tied to other apportionment and flow issues of concern to the United States such as American interest in increasing hydroelectric production from flows at yet uncommitted to power production. This approach is no panacea for the scope to create such negotiating packages may be

limited. Nevertheless, there may be some advantage to returning to some of the perspectives on river basin development that lead to the Columbia River and St. Lawrence Seaway developments. Such a view takes a broad look at interjurisdictional waters to identify uses, developments, and arrangements where both sides would be better off from working together than by working alone.

3. Environmental and ecological perspectives also challenge narrow national interest views. Such perspectives are blind to boundary lines, sovereignty, and independence preoccupations. Government has to balance this view with its responsibility to represent, protect, and advance all societal interests. Quality of life and environmental indicators are important, but only a part of governmental responsibilities. Unfortunately for those groups most concerned with the environment government sets higher priorities in other sectors, particularly in the economic sector. In an international setting the management of the boundary environment imposes costs and benefits and it is the responsibility of the federal government to ensure that Canadians are not disadvantaged in the use and protection of boundary resources. There is a need to develop institutional forms that can reconcile Canadian objectives with the need for broad environmental management initiatives.

It is clear the IJC pinpointed the major strategic problem in dealing with water quality in the Great Lakes. The governments have recognized the concept of the ecosystem and the ecosystem approach to dealing with toxics and other Great Lakes problems. However, the governments as yet do not have an effective binational ecosystem strategy.

The problem is how to conceive and implement such a strategy in an international and otherwise complex inter-jurisdictional setting. It requires a commitment to integrate policy and direction. But what form should that integration take?

There is a persistent theme for reform suggesting that new institutional entities be created. The thrust of suggested institutional reform is to consolidate technical and management skills in an organization with the authority and jurisdiction to effectively tackle the transboundary problems. This might be in the form of a Great Lakes authority or increasing the authority of the IJC to perform the role. However, such reform may not be practical or, on reflection, desirable.

As this paper emphasizes the jurisdictional pressures at work in boundary relations do not easily admit such functional reform. We must live with the expectation that governments will not cede authority or jurisdiction to binational organizations except in very limited circumstances. The manner in which the governments have treated the IJC is an indication of the fact that governments keep a tight reign on international organizations. Authority is given up only where the governments have few vital interests at stake or when they can keep indirect control.

Functional organizations work best when they have been drained of political content. That is they work best when they deal with issues in which major bilateral contentious political policies and orientations have been resolved. In Canada-United States relations we have reached that state for some issues but not others. The issuance of orders of approval on water levels and flows by the IJC is a good example of an issue area the governments can leave to an independent functional entity with little concern. However, management of Great Lakes water quality is still full of vigorous political life. There is agreement in principle on equality, but how it is defined for each issue differs. No international management authority could succeed until the major political questions and principles for each issue have been resolved and the political ramifications of the organization's mandate have been anticipated by the client governments.

There is room, however, to strengthen the IJC and the useful investigative and fact finding role it has proven it can play in bilateral issues. The governments in recent years have shown a shyness in using fully the capabilities of the commission and its staff. The commission was given no new investigative assignments from 1977 to 1985. In approaching issues like Niagara River toxic pollution and acid rain -- issues riddled with the type of technical uncertainty the IJC addresses well -- the governments have turned away from the reference approach. If the governments have lacked confidence in the ability of the commission to handle new challenging assignments it is in their hands to help the commission regain the confidence of government. In addition to providing sufficient financial and personnel resources, the governments must pay particular attention to appointing commissioners of appropriate experience and political sensitivity. Loss of confidence by the governments results from appointment of commissioners more in tune with political and bureaucratic patronage than with the requirements of the job.

4. For many Great Lakes and boundary water issues there is a natural transnational community of interest. Transnational association of like minded interests can work together to give a different perspective that might show the way to new approaches for dealing with some boundary issues and encourages political acceptance of new policies for dealing with boundary issues. The present discussions and agreements among Ontario, Quebec, and the Great Lakes state offers a political approach for building a regional consensus on Great Lakes issues that can have impact on national approaches. Joint study programs between Canadian and American universities can be a fertile area for new ideas. Environmental and other interest groups will contribute their special views on issues of concern to them. One might note the study being undertaken by the Royal Society of Canada and the National Academy of Sciences, funded by the Canadian and American Donner Foundations, to review the progress under the 1978 Great

Lakes Water Quality Agreement. To break out of the mold set by traditional government approaches to boundary water issues these transnational initiatives should be encouraged.

5. The present Inquiry on Federal Water Policy can be seen as a sign of a certain questioning of 1. the federal role in water, 2. the national interest in essentially a provincial resource, and 3. the priorities accorded water issues by the federal government. Boundary issues are certainly one area in which the federal government has a responsibility to represent and define the national interest.

It would be fair to say that in recent years environmental and water management issues have not been a high priority in the federal government. Environmental protection is regarded as a cost impeding the achievement of higher priority economic development objectives. In government environmental interests have lost out to other competing demands on central policy makers time and budgets. As government departments become even more competitive in the struggle to maintain budgets and programs in face of fiscal restraint there is fear that the environmental voice will be further weakened. In such conditions the provincial recalcitrance, American unresponsiveness and other barriers that limit the government's ability to take effective bilateral action can seem insurmountable. But toxic pollution, consumptive uses and other boundary water problems are not going to go away and some of them will become more serious.

Not all barriers may be insurmountable, however, if there is the commitment and interest from political leaders. If they come forward with a clear perception of the national interest in water and the energy to work towards meeting that interest the bilateral process too would benefit.

A major aspect of renewed commitment to a national interest in the environment and in boundary water issues will have to be at the federal-provincial level. The federal government faces a fundamental difficulty. It has the responsibility for dealing with boundary water issues, but not the constitutional authority to act. The provinces have the authority, but not the responsibility to consider the transboundary implications of their actions. Although not in written form, federalism is still evolving in practice, and the federal-provincial arrangements for dealing with environmental and boundary water issues can still be improved by positive initiatives and direction from the federal level. For example, the federal government and Ontario would do well to develop a joint strategy for dealing with consumptive use and apportionment issues in the Great Lakes. Such a joint approach might consider what are the issues from both governments point of view, how would they like to see them resolved, what options would they consider, how should they raise the issues with the United States, can the issues be packaged in way that offers some reciprocal interest to the United States?

6. Much can be done by political leaders personally at the bilateral level. Political leaders can take bolder steps than lower level officials. Their interest and commitment can energize the relevant government departments and the process of bilateral exchange. Interest and commitment does not always solve the problems. For example, if Congress opposes an initiative, Presidential support may not be enough. At the least, putting bilateral water issues on the agenda at high level talks serves an educative function. Positions have to be elaborated and defended. While the Canadian government may not be happy with the American government's policies regarding acid rain, because the issue has been raised in meetings between the President and Prime Minister President Reagan is at least aware that the issue has some significance.

With the apparent good relations between the President and the Prime Minister there is hope that this will give Canadian boundary water concerns a better hearing in Washington. The question is with what force and commitment will the Prime Minister and the political leadership pursue boundary water issues in bilateral discussions?

7. On most issues there are groups and political interests in the United States that share broadly Canadian objections and aims. These groups often have a type of political influence that is taken seriously in Washington, that is they can influence voters. These groups can find solace in finding an ally in the Canadian government. But perhaps the most important support is credible scientific and technical information produced by government departments and addressed to Canadian and allied concerns in the United States. Gradually the findings of Canadian research on Great Lakes water quality, interbasin biota transfers, or acid rain percolate into the mainstream of American political debate and have an effect. When direct approaches to the American government do not work, the reliance on sound scientific and technical argument is often the only alternative that can eventually have a political impact.

In environmental issues there is generally a large element of scientific and technical uncertainty. For example, in the toxic pollution issue there is a widening gap between our ability to detect toxic substances and out ability to interpret and give meaning to the findings. Many of the issues concerning acid rain remain uncertain. When a government is on the defensive, as the American government is on acid rain or Niagara toxics, it will use that uncertainty to delay serious consideration of means to resolve the issue by insisting on further research. Adopting such a position is not necessarily obstructionist. The environmental damage due to continuing with present actions or policies is often uncertain, while on the other hand the costs of remedial action are certain to be high. Governments have a

responsibility to ensure that the abatement actions are worth the price. In a case like acid rain the American officials argue that they are still not certain whether they face an emergency or a problem. If the environment - forest, soils, water - is nearing some threshold point then it may be necessary to spend the billions of dollars to take remedial action. But if the acid rain is simply a problem then continuation of the present domestic program, which foresees a large decline in offensive emissions over the next twenty years should ease the problem.

In face of some of the transboundary problems between Canada and the United States there is a premium on Canada backing its positions with good scientific information. It is needed to identify emerging problems, to strip away some of the uncertainty fogging appreciation of the environmental ramifications and political responsibilities, and to point out feasible cost effective remedial measures. Without such information Canada may become dependent on information produced in the United States to defend Canadian positions.

Environment Canada has long relied on a scientific research capability to advance environmental goals. In bilateral issues it permits the government to adopt a positive stand in dealing directly with the American government. And it gives strength to Canadian members on IJC boards and in IJC investigations. There is no question the department needs to maintain and improve its world class scientific and research capability. Unfortunately the department's ability to foster and encourage world class science is declining through lack of government commitment.

FOOTNOTES

1. Bruce, J. and F. Quinn, 1979. What difference do boundaries make? Canadian water resources journal. 4(3), 5.

2. LeMarquand, D. and A. Scott, 1980. Canada's international environmental relations. In O. Dwivedi, ed. Resources and the environment. (Toronto, M. & S.), 86.

3. Bruce and Quinn, 1979, 8-9.

4. International Great Lakes Diversion and Consumptive Uses Study Board, 1981. Great Lakes diversions and consumptive uses: report to the International Joint Commission. (Ottawa & Chicago) 2-30.

5. Ibid, 6-50.

6. Municipal Abatement Task Force of the Water Quality Programs Committee, 1983. A Review of the municipal pollution abatement programs in the Great Lakes basin: report to the Great Lakes Water Quality Board. (Windsor) 6.

7. Munton, D. 1982. Canadian laws and institutions. In D. Misener and G. Daniel eds. Decision for the Great Lakes, (Great Lakes Tomorrow and the Purdue Foundation), 144.

8. LeMarquand and Scott, 1980. 99.

9. Environment Canada - Ontario Region, 1984. Submission to the Inquiry on Federal Water Policy. 10.

10. The Jay Treaty of 1794, Treaty of Ghent of 1814, Rush-Bagot Agreement of 1817, Webster-Asburton Treaty of 1842, Northwest Boundary Treaty of 1846, and the Treaty of Washington of 1871; for discussion of these treaties see: C.J. Chacko, 1932. The International Joint Commission (New York: Columbia U. P.) 52-70; L.M. Bloomfield and Gerald F. Fitzgerald, 1958. Boundary waters problems of Canada and the United States: the International Joint Commission 1912-1958, (Toronto: Carswell) 2-7.

11. Gibbons, A. 1953. Sir George Gibbons and the Boundary Waters Treaty of 1909. Canadian historical review. 34(2) 127.

12. From U.S. Congress, Senate, 1958. Memorandum of the Department of State, legal aspects of use of international waters. Sen. Doc. 118 85th Cong. 2nd Sess., 7; also 15-21 for United States criticisms of the first draft of the Treaty which reflected Canadian objectives.

13. Ibid, 11.

14. Gibbons Papers, Box 65, p. 392, Telegram from Anderson to Gibbons, Feb. 1, 1909.

15. Bourne, C. n.d. International law on shared fresh water resources. 18.

16. Cohen, M. 1977. Personal communication.

17. See Munton, D. 1981. Paradoxes and prospects. In Spencer, Kirton and Nossal, The IJC seventy years on. (Toronto, Centre for Int'l. Studies), 60-97.

18. Ibid, 83.

19. Ibid, 84.

20. Ibid, 80.

21. Adapted from H.A. Regier, 1984. A sketch of progress with husbandry of the Great Lakes Ecosystem. Institute for Environmental Studies, Toronto, 18 January.

22. International Great Lakes Diversions and Consumptive Uses Study Board, 1981. Great Lakes diversions and consumptive uses. 9-3.

23. Freisen, F. 1979. The international sharing of Niagara River hydroelectric power diversions, Canadian water resources journal. 4(4), 26-38.

24. Ibid, 35.

25. Department of the Environment, 1984. Submission to the national hearing of the Inquiry on Federal Water Policy: issues and options. 63.

26. Thurow, C., G. Daniel, and T. Brown, 1984. The lake effect: impact of the Great Lakes on the region's economy. A report to The Council of Great Lakes Governors. (Chicago, The Center for the Great Lakes).

27. Findings reported in Kneese, A. 1984. High plains, low water, Resources No. 78, 7, from High Plains Associates, 1982. Six-state high plains-Ogallala Aquifer regional resources study, a report to the U.S. Department of Commerce and the High Plains Study Council (Austin).

28. Ibid, 9.

29. The Globe and Mail, February 12, 1985, 3.

30. See IMO, 1983. Seminar on fresh water tanker ballasting, London, 31 May - 1 June 1983 (London).

31. See Beach, C. 1984. Submission to the Inquiry on Federal Water Policy. 18-20, copy of letter from A.J. Brummet, B.C. Minister of the Environment to J. Davis, June 15, 1983.

32. LeMarquand, D. 1984. Water export from Canada by tanker. (Prepared for the Inland Waters Directorate, Environment Canada).

33. International Great Lakes Diversions and Consumptive Uses Study Board, 1981, 9-6 - 9-7.

34. Seaborn, J.B. 1984. The International Joint Commission and the water resources of the Great Lakes. Address to the conference Futures in Water, Toronto, June 12-14, 1984, 16.

35. International Great Lakes Diversions and Consumptive Uses Study Board, 1981, 8-62 - 8-63.

36. Bruce, J.P. 1984. Futures in water -- the climate connection. Address to the conference Futures in Water, Toronto, June 12-14, 1984, 3.

37. Ibid, 4-5.

38. International Joint Commission, 1983. Limited regulation of Lake Erie. (Ottawa, Washington).

39. Schaeffer, E. and M. Downs, 1984. Great Lakes policy issues and the 98th Congress, Center for the Great Lakes, Chicago, 6.

40. International Joint Commission, 1918. Pollution of boundary waters, hearings and final report.

41. Environment Canada, 1983. Canada water year book: 1981-1982, (Ottawa) 80.

42. International Joint Commission, 1982. Addendum to the first biennial report under the Great Lakes Water Quality Agreement of 1978. (Ottawa, Washington).

43. Ibid, 19-22.

44. Ibid, 5.

45. Niagara River Toxics Committee, Report, October 1984. (Environment Canada et al.) 8-27 to 8-30.

46. International Joint Commission, 1982. Addendum to the biennial report. 6.

47. Canada-Ontario Review Board, 1980. Environmental baseline report of the Niagara River. (DOE and MOE under the Canada-Ontario Agreement on Great Lakes Water Quality) June, updated November 16, 1981.

48. International Joint Commission, 1981. Special report on pollution in the Niagara River - January 20, 1981 (Ottawa, Washington).

49. Franzen J. and A. Vincent, 1982. Overview of environmental pollution in the Niagara Frontier, New York. (EPA) 5.

50. Ibid, 4.

51. Information on contents of the sites from Niagara River Toxics Committee, 1984. Report, October 1984.

52. Ibid, 8-27 to 8-30.

APPENDIX 1

Terms of Reference

Objectives

To provide a perspective of Great Lakes water quantity and quality issues in the context of overall Canada-U.S. boundary water relations as these have evolved since 1909; to determine appropriate research jurisdictional, institutional and policy considerations for formulating a federal response to Great Lakes-St. Lawrence water-related issues.

Tasks

1. To review the historic and changing concerns of the federal government in its boundary relations with the U.S. and the evolution of bilateral institutional arrangements; set Great Lakes-St. Lawrence issues within this larger transboundary perspective.

2. To analyze current and emerging issues related to water quality (bacteria, eutrophication, toxics, acidity) and quantity (lake level regulation, diversion, consumption), focusing on (a) impacts and conflicts - who benefits and who loses among the different users and jurisdictions, and (b) political and institutional responses - present bilateral arrangements, federal responses to the issues, and their strengths and weaknesses.

3. To recommend appropriate measures with respect to research needs, management strategies and institutional changes to improve federal responses to current and emerging Great Lakes water issues.